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ABSTRACT

One in a series of papers by the Rural Research Agency devoted to the study of telecommunications services and systems sponsored by the State of Alaska, this paper concentrates on the technology of television delivery and distribution to the citizens of the state. It most closely scrutinizes entertainment television, but much of its analysis is equally applicable to instructional telecasts. The study is structured into sections addressing areas of interest including: (1) Satellite Television Today; (2) Technology in the Future; (3) Systems in the Practical Sense; (4) Programming Issues; and (5) The Costs of Alternative Systems. The document contains both an executive summary and individual chapter summaries. The latter are somewhat more specific than the executive summary and contain recommendations developed through research. A bibliography and list of persons interviewed are included. Appendices include lists of commercially and community-owned cable systems in Alaska; a list of communities without commercial television arranged by 1982 population; a partial list of satellite television programs available to viewers in Alaska by type of programming; satellite television program fees; and requests for/complaints about lack of public television service as received by Alaska's four public television stations during 1984. (THC)

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SATELLITE TELEVISION IN ALASKA

rural research agency
august, 1984

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STATE SPONSORED TELEVISION IN ALASKA

Alternatives

For

Delivery and Distribution

One In A Series Of Papers
On Alaskan Telecommunications

By

The Rural Research Agency
Richard Rainery
August, 1984

Alaska State Senate
Community and Regional Affairs Committee

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INTRODUCTION

This document is one in a series of papers by the Rural Research Agency devoted to study of the telecommunications services and systems sponsored by the State of Alaska. This particular paper concentrates on the technology of television delivery and distribution to the citizens of the state. It most closely scrutinizes entertainment television, but much of its analysis is equally applicable to instructional telecasts. Others in the series focus on the Learn Alaska Network and administrative and organizational issues and on the telecommunications functions of the Legislative Affairs Agency. The purpose of these monographs is to provide a basis for a comprehensive evaluation of these systems and services to be utilized as a tool for long range planning of the future operations of the relevant entities.

This study is structured into sections addressing areas of interest which may, at times, appear to overlap. This serves only to emphasize the difficulty encountered in separating the many theoretically discrete facets of our subject. We believe that the significant questions and concerns are adequately examined, but, unavoidably, details of the costs of alternative delivery systems are not complete in all cases. Costs and systems are rapidly changing in many instances. It would require establishment of specific technical parameters, which are beyond the scope of our expertise and charge, to precisely identify all the costs which are considered herein.

* * * A Note On Reading * * *

This document contains both an Executive Summary and Conclusion and individual chapter summaries. The Executive Summary leads off the report and is printed on colored paper. The chapter summaries, also printed on colored pages, are somewhat more specific than the Executive Summary and contain recommendations developed through our research in the appropriate place within the flow of analysis. A number of "minor" recommendations not discussed in the overall summary are also found here. This organization allows readers to do their initial reading by chapters and thus find in depth text more readily, if and when desired.

- - Errata - -

Since the composition of this paper, Mel Hoversten, Director of the Division of Telecommunications Operations, has been appointed acting Deputy Commissioner for Telecommunications for the Alaska Department of Administration.

EXECUTIVE SUMMARY

SATELLITE TELEVISION TODAY

The questions fundamental to planning for future State involvement and potential alternatives to the present systems are:

1) Is the current system the best technological means of distribution and delivery?
2) What are the alternatives and how do they compare in flexibility, cost, and practicality to the present arrangement?

In lieu of a detailed description of the deployment providing the Rural Alaska Television Network (RATNET) and the Learn Alaska Network (LAN) and the extent of service to viewers, some important features are highlighted in the first chapter. An illustration of the systems' technology is included.

Two other issues of significance to telecommunications in general are noted below.

> 1) The Federal Communications Commission has, in the past, allowed the State of Alaska to intervene in proceedings, ensuring that new satellite services included Alaska, instead of being limited to the continental U. S. Recent decisions have allowed some new satellites to be so limited. The FCC also is now considering reducing satellite orbit arc spacing requirements from 2° to 4°. This could compel Alascom to replace its spacecraft with one relying upon narrower beam, more directional transponders, incompatible with earth stations in rural Alaska.
>
> 2) The role of Alascom in any redesign of the State television delivery and distribution network must be acknowledged. The firm is a virtual monopolist in intrastate telecommunications and has a substantial investment in providing ITV and TVP via satellite, for which it receives annual tariff payments in excess of $5,000,000. It will likely have to be involved in any change.

TECHNOLOGY IN THE FUTURE

The fundamental question dealt with in this chapter is:

> What will be the future technologies of television delivery and distribution and what are their strengths and weaknesses?

The satellite delivery portion of any system, in the ideal, should not be of primary concern to the State of Alaska. All satellites have communications channels which are basically "transparent" to any and all users. The State is in a relatively enviable position in this respect for two other reasons:

> The magnitude of the annual State budget for television may encourage competition if service quality were to decline.

The State, as a lessee of services, is relatively sheltered from the economic consequences of system obsolescence and shares all resultant costs with other users.

No immediate change in the Alascom system is anticipated. Alascom will be launching new satellites within a few years as added capacity, but it likely will be the next decade before significant changes take place. One possible change is the addition of higher frequency KU bandwidth transponders to the C bandwidth transponders now on Aurora.

Technology options and innovations for television delivery and distribution predicted to be viable, to one degree or another in Alaska, include the following major items:

- "Dual transmission" format would reconfigure the present system to allow both State networks to be transmitted via a single satellite transponder. Primarily a simple, cost saving measure which has been discussed in the legislature previously, there are a number of technical uncertainties associated with the dual format. The major one concerns the strength and quality of signal in relation to the receiving capabilities of small bush earth stations. A dual format system may impair quality and variety of services and should, under no circumstances, be implemented prior to testing at bush earth stations statewide.

- Cable systems are already a fixture in numerous rural communities. They offer a proven technology, which has the ability to offer features such as multiple channels, interactive services, and public access. Maintenance can be costly, however.

- "Block Down Conversion" (BDC) systems are a rapidly developing technology for local distribution that may prove to offer all the advantages of cable systems and then some at much less initial cost and reduced future maintenance costs. There are some unanswered technical questions on the viability of over the air distribution of blocked down signals, which would likely be preferred in Alaska, and the reliability of individual home tuners. The State should thoroughly investigate the viability of these systems, comparing their performance and cost with cable systems. In particular, the possibility of a demonstration project (perhaps at no cost), should be pursued.

- Multi-channel, multi-directional microwave distribution units could be used as a single central distribution center to local television plants in clusters of neighboring communities.

- "Direct Broadcast Satellites" (DBS) sending signals received directly by individual homes are a de facto phenomenon presently, although direct broadcast is not yet the intent, and will be a future fixture. That DBS will be a major factor in rural Alaska seems unlikely due to a combination of economic (insufficient subscriber pool) and technical (weather interference and signal strength) elements.

Several other technical concerns are noteworthy, particularly the spread of digital telecommunications technology and the advent of stereo and high definition television. Some current technologies, such as cable, may have difficulty adapting to these innovations. The State should consider any opportunity to redesign its television system to embrace digital equipment. Alternatives for delivery and distribution should be evaluated, in part, on their capability to adapt to innovations like stereo and high definition television.

While satellite communications channels are essentially "transparent" to different signals, satellites must meet certain basic criteria to be suitable for use in an Alaskan system. They must be visible (have a good look angle) to earth stations across the state and the strength (radiated power) of their transmissions must be sufficient to send an acceptable signal to those stations. A table lists likely candidates as replacements for Alascom's Aurora, if necessary, and an illustration of orbital positions is included.

SYSTEMS IN THE PRACTICAL SENSE

This chapter is the core of our study and addresses three basic questions:

> Are the technological options available practically viable?
>
> Will alternative systems allow the State to terminate its involvement in the Television Project (TVP)?
>
> Are alternatives affordable to and manageable by local residents?

If TVP had never existed or ceased to exist, would rural Alaskans be bereft of entertainment television? Some seventy rural communities now have local television plants in operation or planned. These are both community owned and private enterprises. A few communities with fewer than 100 residents have their own systems. It appears as though more and more cable or other systems will be penetrating the bush in the near future. At least one Alaskan firm (United Utilities) has plans to extensively canvas the bush to locate communities to add to those in which it already has systems. Just which villages can confidently count on being included in this boom and which will have to continue to depend upon publically subsidized television is uncertain. One could assert, with some assurance, that many of the villages in the 300 to 400 population range which now rely on TVP for recreational TV will have other sources in the future, with or without TVP. Below the 200 mark, 87% of which communities are without commercial television, it is much more difficult to make such a prediction. An assessment of the likelihood of further penetration of private sector or community owned televisions systems into rural Alaska should be a part of any decision process aimed at determining whether and to what extent the State of Alaska should continue to be involved in the provision of entertainment television.

For purposes of comparison with the options listed in following sections, the expected costs of continuing the present arrangement, for the Television Project alone, for FY 85 - FY 94, are:

$35,579,000

The Alaska Department of Administration (ADOA) has investigated a number of alternatives to the current system:

1) Their unofficially preferred option aimed at getting the State out of the business, is to provide 3 channel cable systems to 166 communities through capital grants totalling about $16,250,000. Programming, maintenance and operations could then be local responsibilities. The State would stand to save up to $4.6 million in annual costs. Ten year recurring costs are variously pegged at $7,500,00 for State maintenance or $14,300,000 for the private sector.

2) Retransmission of a "super station" like Atlanta's WTBS over the current system would entail essentially the same costs to the State as are incurred now (about $32.6 million over ten years). This would be a unique arrangement that would require negotiations with the station involved. The State would likely have to continue its support.

3) Direct transmission of a super station to bush earth stations. A number of new earth stations would have to be built (estimated cost - $6.5 million), recurring costs would about a tenth as much as the previous option, but the State may also have to pay termination liability charges of $1,000,000 to $2,000,000 to Alascom. State involvement would probably persist.

4) A combination of the first and third options, with cable systems being built after two years, multi-point distribution systems, and community systems based on programming received from a Canadian satellite were also considered. The Canadian alternative would preserve State involvement, while the first two ideas offer little significant advantage over any of options 1), 2), or 3).

The preferred option of community operated three channel cable systems is the best of this lot, offering the end of State involvement in entertainment television at a significant cost advantage over currently anticipated long term costs, while providing increased programming, local control, and proven performance in rural Alaska.

Other configurations for a new delivery/distribution system include the following major options:

1) Private sector operation of the current system has been considered in passing. Little information is available on this alternative.

2) Dual transmission format could be implemented without impacting other State telecommunications activities. The price for transformation would be about $1.9 million. This would continue

State involvement, at some cost savings ($880,000 annually), but would lock the system into its present shape otherwise.

3) Conversion of both the ITV and TVP transponders to a dual signal transmission mode would provide four channels of programming. Capital costs would be significantly higher than option 2), at least $7,500,000. State involvement would continue and recurring cost would be somewhat higher than at present due to additional programming expenses.

4) Multiple Systems Operators are cable systems serving several communities through a single earth station. Little information is available on this option, although industry sources state that a public subsidy of some sort would be necessary.

5) Block Down Conversion systems can offer everything that cable systems can except a history of proven performance in environments similar to rural Alaska. They are adaptable to innovations known to be on the horizon. The costs for a twelve channel over the air system in rural communities now relying upon TVP for commercial TV could be as little as $4.7 million dollars or as much as $12.5 million. Community grants followed by local O & M could sever the State connection to TVP. Whether the FCC will license such operations, for which it presently has no licensing category, is unknown at this time.

The State can remove itself from the entertainment television business at a long term savings. If it should be affirmed that the provision of commercial television to rural Alaska is proper public policy, then several decisions must be made. The first concerns the role to be played by the State. Should the present system be preserved or should the State subsidize the capital and operating costs of a new technological solution? A variation on this theme would make only capital grants available, requiring that operation and maintenance be a community responsibility. Cost factors and the opportunity for the State to disengage itself from this service, while enabling the continuation of service suggest the latter approach. Still other questions must be answered. Should all communities without commercial television be included in the eventual program or should the State assume that the private sector will move in to some? Two systems, cable and block down conversion, appear to embody the best alternatives to the present system based on improved service and cost savings. The State should be carefully weigh the advantages and disadvantages of the two and support one for rural distribution.

The choice of satellites carrying appropriate programming and that can be received in rural Alaska is of primary importance to any redesign of the present scheme. Satellites must be in view from all parts of the State and have powerful enough signals to be picked up on small earth stations, if directly downlinked. There are about ten satellites that could be used in Alaska, several do have transponder space available, should an alternative to Aurora be required.

Both the Learn Alaska Network and the Alaska Public Broadcasting Commission seek the acquisition of in-house ability to uplink signals to satellite transponders. LAN's proposal is for a single uplink, costing about $150,000, which would theoretically result in $88,000 annual saving in operations costs. The APBC plan, still informal, calls for uplinks at each of the four Public Television stations in the state at approximately quadruple the cost of the LAN proposal. This concept has received an initially frosty reception at Alascom.

Some technical problems inherent in the present delivery system have been identified and are in various states of remedy. A major thorny point is the poor operation of the KYUK translator system, the signal quality of which decreases as new translators are added, extending the signal range. Procedural problems have delayed the completion of the delivery of ITV and TVP as envisioned by the legislature. The FCC licensing process grinds on for about 50 ITV and TVP sites. About another twenty-five communities have slipped through the cracks during the process of allocating monies appropriated by the legislature.

Several fundamental policy issues have caused controversy. The LAN and ADOA have serious differences of opinion on three significant matters.

1) Dispute over technical standards for the reception of ITV has been a live item for some time. This problem seems the result of a perceptual difference concerning acceptable reception quality.

2) There is disagreement between the two agencies on whether a formal document specifying their respective responsibilities toward television provision is needed. LAN has repeatedly pushed for a memorandum of agreement in this area, while ADOA has staunchly maintained that such is unneeded.

These differences should be resolved internally between the two agencies, to their mutual satisfaction. It appears as though better communication would be a significant step in that process.

3) Several urban areas, most importantly Anchorage and Fairbanks, are without LAN broadcasts. ADOA has pursued distribution of the LAN signal in these and other areas through cable and other means and asserts that the public most in need of reception has, or will have, it in the near future. LAN seeks to provide universal coverage through full service VHF stations in those communities (at a capital cost of $ 1.7 million). The Anchorage School District and KAKM, the local public television station, both asserted that such a station would be a duplication of services.

The need for and means of expansion of LAN service to urban areas should be carefully examined. The construction of full service VHF stations may be unjustified, given the alternative provision of LAN programming to the communities in question.

Both ADOA and LAN have stated some serious reservations and questions about the precise nature of their purpose or the future of the networks for which they are responsible, despite the original and subsequent directives from both the legislature and the executive. Each has requested clear statements of legislative intent in those two regards. The legislature should develop a firm and explicit statement on the purpose and goals of both State sponsored networks.

PROGRAMMING ISSUES

If the dual transmission mode is implemented, current programming, substantially as it now exists, LAN and RATNET, would have to be continued. A switch in programming sources would not be possible without altering the dual format arrangement. The long term future of LAN and RATNET should be defined prior to such a conversion.

RATNET has obtained its programming from national broadcast network affiliates in Anchorage, in exchange for State sponsorship of the uplink of live programming from the continental United States. By early next year, all the affiliates will have the ability to receive live satellite feeds themselves. It is unknown whether this will impact their willingness to provide, without charge, programming to the State. The State should pursue a written agreement to ensure continuation of the present arrangement, if RATNET is to survive in its present form.

There are over fifty satellite channels receivable in Alaska. More of these channels would be available in a system which first downlinked transmissions to Anchorage and then relayed them out to the bush, because more satellites can be seen from that city. Larger dishes than those now in place in most rural communities would allow the reception of additional satellites there also.

Several substitutes for the programming discussed in the preceding paragraphs do exist. These include:

> Local programming produced primarily for local distribution. Such production is already taking place in rural communities with access to local facilities.
>
> Public television broadcasts from the four Alaskan stations. Through regional uplinks, this programming could be a part of any delivery/distribution network, including the present one.

Two additional questions are suggested by the topic of this chapter.

> What kind of programming do the viewers of ITV and TVP want?
>
> What is the purpose of each of the two networks?

It was not our charge to examine these questions, but they are difficult to ignore completely, since programming choice is closely related to delivery. A number of observations, in the absence of hard knowledge, on the needs and desires of the audience of LAN and RATNET should be made.

- A variety of commercial programming is desired and available.

- Locally produced programming is desired and supported by rural residents.
- Public television broadcasts, at least according to the APBC, are a staple that rural viewers desire for their video diets.
- There is some controversy over the level of ITV's audience share and the actual utility of scheduled, live programs in the classroom as opposed to independent use of videotaped ITV.
- The viewing preferences of ITV and TVP audiences are not clearly defined.

A comprehensive needs assessment and utilization profile of ITV in the home and in the classroom should be undertaken. This effort should address the need for live broadcasts versus broadcasts for taping purposes. A survey of viewing patterns and preferences, in general, for TVP should be undertaken.

THE COSTS OF ALTERNATIVE SYSTEMS

This chapter examines, in finer detail, the cost estimates associated with some of the systems considered herein. Rather than summarize the full range of information on costs found in this chapter, that having been accomplished previously, this recap will focus on items as yet undiscussed.

The system alternatives for which pricetags have been calculated are:

1) The current system
2) A dual transmission system (one and two transponders)
3) Delivery of a "super station" via several means
4) A three channel community cable system network
5) A community multipoint distribution system network
6) Delivery of Canadian satellite transponded programming
7) A direct broadcast satellite system
8) A twelve channel community block down conversion system network

Some individual items of interest are:

- The costs of operating the Television Project will decrease $200,000 in FY 85 and another $735,000 in FY 86 as a direct result of Anchorage network affiliates obtaining their own satellite earth stations. Annual cost will then be approximately $2,900,000.

- Termination liability refers to the financial obligation of the State in regard to facilities for the delivery of TVP and ITV constructed by Alascom specifically for that purpose. Alascom would seek compensation equal to part of the cost of those installations should the State discontinue their use. ITV costs would be $1.5 million and TVP dues from one to two million dollars. The latter cost may be avoidable, according to ADOA.

- Two elements of the calculation of recurring financial burdens associated with substitutes for the current system made in the Division of Telecommunications Services' report, Satellite Television Alternatives Study, may not stand closer scrutiny.

  1) Separate estimates were made for system maintenance costs based on State and private sector responsibility. These costs were judged to be substantially higher for private upkeep. ADOA's judgement (an annual pricetag based on 8 % of initial capital costs) relied on service contract prices and informal conversations with cable operators. There are reasons to believe that these estimates may be overstated. For one, the cost of a service contract is difficult for a small community to bear and apparently few have opted to carry them. In addition, anecdotal examples indicate that many villages have had few, if any, maintenance problem. The use of reliable equipment and proper installation of the same seems to have been the key in those cases.

  2) The factors of inflation and rural population growth used to extrapolate long term costs may be flawed. ADOA's figure for population growth is nearly 5 % annually, based upon 1980-1982 data. Long term growth in the bush has been much less than that, ranging between 1.5 % and 2.5 % from 1970 to 1982. The prediction that inflation will remain constant at an approximate 4 % rate for the next ten years would seem to be a little optimistic.

- There are two disparate estimates of the costs of developing community Block Down Conversion systems made in this chapter, based on information provided by two sources. This being a new technology, which is on the verge of mushrooming growth, costs are likely to be volatile in the near future.

CONCLUSION

The major questions that the State, beginning with the interim task force on telecommunications, must resolve are three:

1) A decision on the future of the current delivery and distribution system and process must be reached. If it is to survive unchanged, ADOA should pursue a written agreement with the three Anchorage national broadcast network affiliates ensuring that the provision, without charge to the State, of programming for RATNET is preserved, for so long as that network is sponsored by the State.

2) Is it proper public policy for the State to be involved in the provision of entertainment television? Assuming the present position to be reaffirmed, then the next question is how to best provide that service. A number of technological alternatives are possible. On a cost and service provided basis, two, either cable or block down conversion, seem to stand apart from the pack. By providing capital grants for local television plants, the State can accomplish several things:

   - It can save money over the long run (ten year) operating costs of the present system, assuming that operation and maintenance of the new local plants to be local responsibilities.

   - It can divorce itself from involvement in the continuing provision of entertainment television, once it has made available capital grants.

   - Local people will have been given the opportunity to obtain television systems that provide greater programming variety, auxiliary capabilities, and future flexibility than offered by the current arrangement.

   Should the State decide to pursue this alternative, the tasks left to the task force, or its successors, will include deciding how to phase in such a recapitalization. This will be a particularly difficult decision in light of the fact that the number of private sector and community owned systems in smaller communities has been multiplying recently and will continue to do so. To put into place approximately 170 new community stations will likely take considerable time, as the implementation of the current project demonstrates. What is still unknown is which communities will be acquiring other systems, although it appears as though the population cutoff point will be relatively low, perhaps less than 300 residents. A simple solution, given the time it will take to implement a recapitalization, might be to begin with the smallest communities, thus giving market forces time to work elsewhere. However, it may be that local residents will put off supporting a non-State system in anticipation of a "better deal" if the State pays the way.

3) Finally, with or with out a change in the operation of the TVP and or ITV, it is imperative that an explicit and comprehensive statement of the purpose and goals of both networks be a product of

this effort. Such a plan would likely eliminate many of the problems and controversies inherent in the present arrangement. The statement will have to include the following:

- A concise statement of the purpose of both the Television Project and of Instructional Television. The specific tasks and future of both networks must be mapped out in sufficient detail to provide direction for long range activities.

- The responsibilities of all participants, particularly in areas of conflict between involved agencies, i.e. maintenance, planning, etc., should be plainly and firmly delineated.

It is apparent that the Legislature will have to actively participate in and lead the development of such a plan. The details of a plan will depend in great part on how the first two questions are answered.

Chapter I

Summary and Recommendations

SATELLITE TELEVISION TODAY

The first chapter is devoted to establishing the issues central to our inquiry, briefly describing important features of the two State sponsored networks, and bringing attention to two items of general importance to Alaskan telecommunications.

A) The Issues

The questions fundamental to planning for future State involvement and potential alternatives to the present systems are:

1) Is the current system the best technological means of distribution and delivery?
2) What are the alternatives and how do they compare in flexibility, cost, and practicality to the present arrangement?

B) The Current System

In lieu of a detailed description of the deployment providing the Rural Alaska Television Network (RATNET) and the Learn Alaska Network (LAN) and the extent of service to viewers, some important features of the network are mentioned in the first chapter. An illustration of the systems' technology is included.

C) From Washington, D.C.

One pending decision and a recent trend in rulings by the Federal Communications Commission have the potential to impact satellite telecommunications in Alaska.

1) The FCC has, in the past, accorded the State of Alaska the right to intervene in proceedings, ensuring that new satellite services included Alaska, instead of being limited to the continental U. S. Recent decisions have allowed some new satellites to be so limited.

2) The FCC is now considering reducing satellite orbit arc spacing requirements from 2° to 4°. This could compel Alascom to replace its spacecraft with one relying upon narrower beam, more directional transponders, incompatible with earth stations in rural Alaska.

* * * Recommendation * * *

> The State should monitor closely FCC activity and present a strong, coherent position on the its interests to the Commission.

D) And Here At Home

The role of Alascom in any redesign of the State television delivery/distribution network must be acknowledged. The firm is a virtual monopolist as a carrier of intrastate telecommunications and has a substantial investment in providing ITV and TVP via satellite, for which it receives annual tariff payments in excess of $5,000,000. So, it must be presumed to be most interested in the continuance of the status quo, or at least, in the selection of an alternative that does not threaten its position. Alascom will likely have to be closely involved in any change.

* * * Recommendation * * *

> The State should be aware of Alascom's role in system redesign and may have to aggressively push planning efforts for and implementation of such change.

Chapter I

SATELLITE TELEVISION TODAY

We will begin this paper by spelling out the basic issues upon which it will focus. Following that, rather than describing in depth the current system of television delivery for the two State funded networks and its historical development, some salient features of the present arrangement, which are of particular significance to our work, will be listed. Finally, two other matters of importance for the provision of telecommunications in general and, by extension, television, in Alaska, will be outlined. The first of these concerns federal communications regulation and the second item relates to the current structure of intrastate telecommunications.

A) The Issues

For this paper on television, the purpose of which is to provide specific information for planning deliberations on the future of the State of Alaska's two television networks, the primary questions are as follows:

1) Should State sponsored television delivery and distribution be redesigned or reconfigured? Are there appropriate, cost effective alternatives to the present system?

2) How can a conversion or redesign of State television delivery systems best be implemented in order to ensure that current service is maintained or improved? Additionally we shall examine the technical limitations to such improvements and the practical considerations such as programming considerations, provider/user relationships and cost factors.

3) Will continuation of the current system or conversions or innovations to it limit the State's ability to respond to technological advances? Whether the State will retain the flexibility to adapt to change or find itself locked into a system likely to become rapidly obsolete is of paramount significance.

4) What delivery and distribution options are now, or will be in the future, available? What is the long term viability of these systems? What are the capital and operating costs associated with alternative systems?

B) The Current System

In lieu of a thorough description of the technical intricacies, the physical deployment, and the service provided via the current delivery system for the Learn Alaska Network (LAN) and the Rural Alaska Television Network (RATNET), several important features and statistics related to those items are listed below. In addition, we include an illustration on the following page which describes the Alascom television system. This graphic very clearly lays out the process of providing television to all LAN and RATNET viewers. The information below was, for the most part, obtained from the Alaska Department of Administration's report, Satellite Television Alternative Study.

1. There are 248 earth stations in the delivery system; 164 are owned by Alascom and leased by the State, each network paying $572 per month per site, and another 84 are owned by the State.

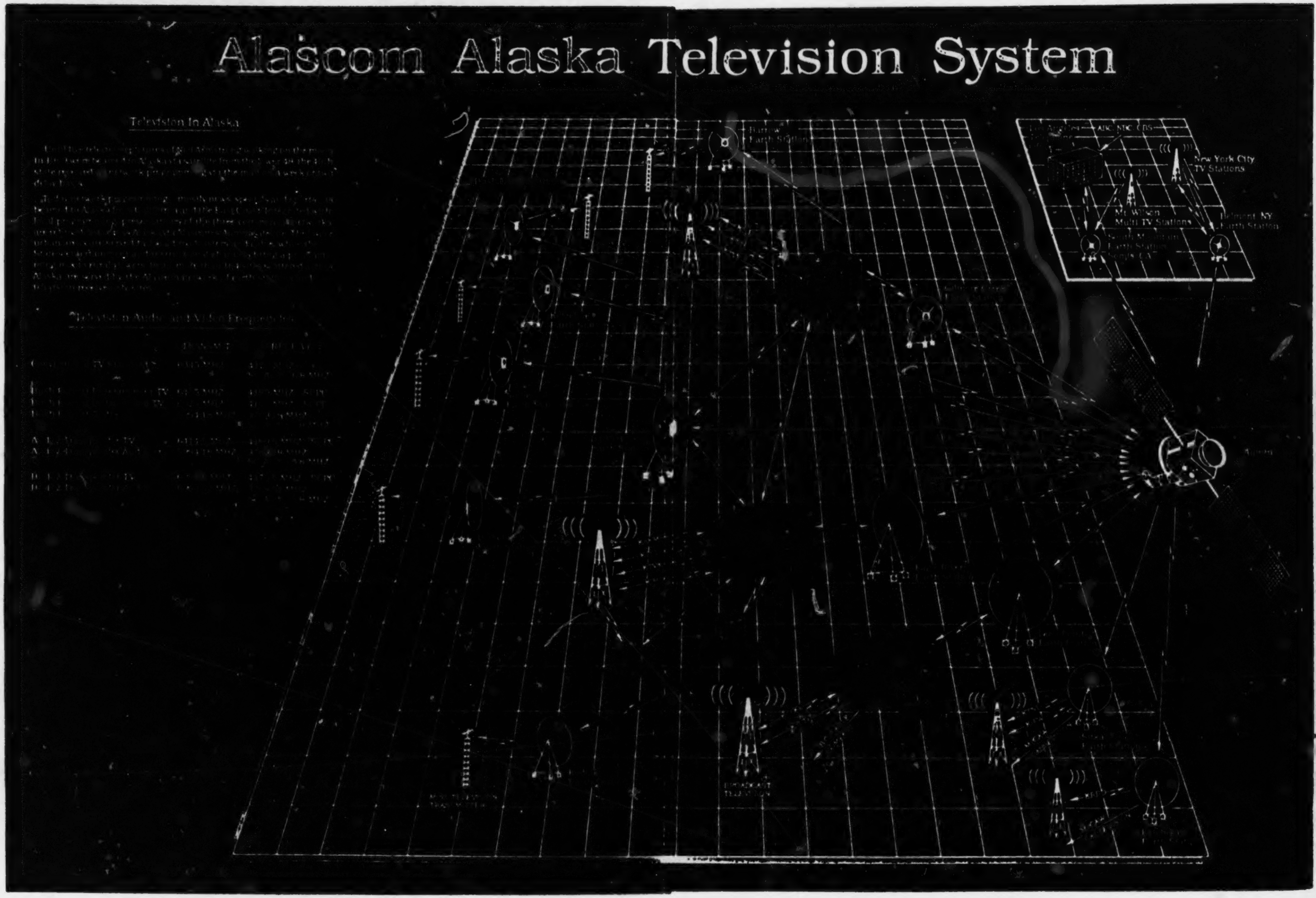
2. State funded microwave systems extend Anchorage commercial broadcasts to Eagle River, the Kenai Peninsula and Girdwood.

3. At latest count (April 1984), the Television Project (TVP) provided entertainment television to 227 communities. Of these, 213 have TVP facilities and another 14 receive TVP programming (as selected by the RATNET board) over the air from neighboring communities. Licenses to begin broadcasting in another 19 communities in which facilities have been constructed are pending before the FCC. RATNET broadcasts twenty hours a day into about 29,700 households.

4. As of July 1984, Instructional Television (ITV) was available in 227 communities. These 227 communities are not the same 227 noted above, a number have only one or the other network at present. The number of other communities receiving broadcasts over the air from neighboring communities is probably about ten or twelve, according to the Learn Alaska Network. Additionally, thirty-three localities are awaiting FCC approval of license applications, 20 of these have equipment purchased and construction contracts ready. The Learn Alaska Network broadcasts 18 hours a day, but the number of households receiving ITV over the air has not been established. Many communities receive ITV over local cable systems, how many is unclear.

5. In 166 communities, the TVP is the sole source of commercial (entertainment) programming. These towns have a population of about 32,200 and comprise approximately 10,220 households.

6. A recent study by Epic Engineering of Anchorage asserted that about 95% of the state's population receives some benefit from the TVP, either through the provision of RATNET programming in the bush or of live national network programming in urban areas.[1] This number will changed by now, since two of the three network affiliates in Anchorage have their own satellite earth stations and no longer need State funded downlink ability. The third affiliate expects to have service by early 1985.



Alascom Alaska Television System

Television In Alaska

Television Audio and Video Frequencies

Source: *The Alaskan Telecommunications History,* Alascom, Inc.

BEST COPY AVAILABLE

7. The current system has cost the State from $11,000,000 to $12,000,000 for equipment and installation. Alascom has spent about another $13,000,000 on TVP facilities alone, again according to the Epic Engineering report. The cost of ITV facilities is not readily available, according to Alascom. The operating costs are, for both networks, about $7,200,000 for fiscal year 1985.

8. Although not a part of the system described in this chapter, the Alaska Public Broadcast Commission helps to support four full service public television stations in Anchorage, Fairbanks, Juneau and Bethel. These stations downlink programming from the national Public Broadcasting System, in addition to airing locally produced fare. In Southeast Alaska, the communities of Ketchikan, Sitka, Petersburg, Kake, Angoon, and Wrangell receive public television (Juneau's KTOO) via a microwave system originating at Alascom's Lena Point Earth Station. KYUK in Bethel provides service to thirty to forty Yukon-Kuskokwim Delta villages over a network of twenty-two translators.

The Learn Alaska Network and Rural Alaska Television Network together comprise the most unique and probably largest single television delivery system (in terms of sites) in the United States and the world. When established, beginning in 1977, the system, including both its State of Alaska and Alascom components, was relatively close to the sharpest edge of technology. This system, while not perfect, has stood well the test of time.[2] It has gone through one major evolutionary change with the launching of Alascom's Aurora satellite and has seen its performance improve with that change. That change emphasizes a point of some significance for the future of telecommunications in Alaska, at least as far as the State is concerned. Satellites will come and go, but it is unlikely that changes in the communications capabilities of satellites will impact the ability of the State to deliver LAN and RATNET television programming to the public (more on this in the second chapter).

C) From Washington, D.C.

Two issues currently in the regulatory spotlight may have a considerable importance for satellite telecommunications generally in Alaska and thus for satellite television delivery. Both involve the Federal Communications Commission (FCC).

- The FCC currently sets satellite spacing requirements at 4° in their arc of orbit over the equator. This 600 mile gap between satellites has been established to minimize interference between the transmission beams of the fleet of spacecraft in their geosynchronous orbits. If the FCC, as it is considering, reduces to 2° the spacing standard and requires narrower, more directional telecommunication beams to avoid "splattering", Alascom's Aurora may be impacted. Narrower beams would affect reception on the 4.5 meter dishes prevalent at rural earth stations; Alascom testified that it would likely be outside current specifications for acceptable picture quality. Since Aurora is on the outside of the equatorial orbit zone and since it has applied to be granted the adjoining arc, Alascom believes that it will be exempted from any requirements for narrowed beams. If not, earth stations would have to be retrofitted with more sensitive antenna and the possibility of replacing Aurora with a KU bandwidth (see chapter II) satellite would have to be entertained. Earth station retrofits could cost as much as $35 million.[3]

- Until recently the FCC has allowed the State the right to unilaterally intervene in all hearings concerning satellite telecommunications. Previously, The FCC had directed that all communications satellites provide service to all fifty states, at least partially as a result of the State's comments. Recent decisions have allowed the exclusion of Alaska and Hawaii from the "footprint" of some new satellite systems. The State should be in a position to closely monitor the actions of the Commission and to present its case for access to regulated telecommunications systems. Strong representation is vital to the State's interests, particularly in light of the FCC's current inclination to let the market guide the development of satellite telecommunication services. Alaska, with its small population and economic weight, is not so important a market as to be able influence satellite communications providers on that basis alone.

D) And Here At Home

A matter of some delicacy and complexity involves the interrelationship of the State and the sole major Alaskan intrastate satellite telecommunications carrier, Alascom, Inc. Alascom, as RCA Alascom previously, and under its current ownership, has been intimately associated with both the TVP and ITV networks since their inceptions. Alascom has a great stake in the operation of these services and wants to see them continued. It is their satellite telecommunications system that delivers television signals to the nearly 250 communities that are included in these networks. They have invested well in excess of $13,000,000 in TVP and ITV related facilities. In FY 1985, the State will pay Alascom approximately $5,073,000[4] for tariffed satellite television services. As evidenced by two specific items, their reaction to the possibility of State owned uplinks and the amount of termination liability they would claim from the State if use of facilities constructed for the delivery of ITV and TVP were discontinued, both of which will be discussed in ensuing chapters, it would seem that any major policy changes concerning those delivery systems will have to consider that firm's interests. Initial indications from Alascom officials concerning possible alterations to the current arrangement have suggested that the organization will attempt to protect its investment and quite naturally so.

The State and Alascom are, for the foreseeable present, inextricably bound together in the provision television to Alaska's smaller communities. The firm's position as virtual monopolist of intrastate satellite communications may, so long as it exists, put them in a position to be very influential in deliberations on the future of RATNET and LAN. At the very least, it should be expected that Alascom will follow closely the process of articulating long range plans and goals and the development of design modifications or innovations for the two State television networks. The company will and surely should have some weight in those proceedings and subsequent implementation.

Chapter II

Summary and Recommendations

TECHNOLOGY IN THE FUTURE

The fundamental question dealt with in this chapter is:

> What will be the future technologies of television delivery and distribution and what are their strengths and weaknesses?

A) How Does It Get From Here From There?

The satellite delivery portion of any system, in the ideal, should not be of primary concern to the State of Alaska. Satellite telecommunications channels should be basically "transparent" to any and all users and distribution systems. The State is in a relatively enviable position in this respect for two other reasons:

> The magnitude of the annual State budget for television may encourage competition if service quality were to decline.
>
> The State, as a lessee of services, is relatively sheltered from the economic consequences of system obsolescence and shares all resultant costs with other users.

No immediate change in the Alascom system is anticipated. Alascom will be launching new satellites within a few years as added capacity, but it likely will be the next decade before significant changes take place. One possible change is the addition of higher frequency KU bandwidth transponders to the standard C bandwidth transponders on Aurora. State television signals (and other communications transmissions, generally, in Alaska) are C bandwidth.

* * * Recommendation * * *

> The State should ensure that sufficient C band transponders are available on any new satellite, if the current television system is to be retained.

B) The Means of Delivery and Distribution

Technology options and innovations for television delivery and distribution predicted to be viable, to one degree or another in Alaska, include the following major items:

- "Dual transmission" format would reconfigure the present system to allow both State networks to be transmitted via a single satellite transponder. Primarily a simple, cost saving measure which has been discussed in the legislature previously, there are a number of technical uncertainties associated with the dual format. The major one concerns the strength and quality of signal in relation to the receiving capabilities of small bush earth stations.

* * * Recommendation * * *

> A dual format system may impair quality and variety of services and should under no circumstances be implemented prior to testing, at the least, signal quality at bush earth stations statewide.

- Cable systems are already a fixture in numerous rural communities. They offer a proven technology, which has the ability to offer features such as multiple channels, interactive services, and public access. Maintenance may be a costly problem, however.

- "Block Down Conversion" (BDC) systems are a rapidly developing technology for local distribution that may prove to offer all the advantages of cable systems and then some, at much less initial cost and reduced future maintenance costs. There are some unanswered technical questions on the viability of over the air distribution of blocked down signals, which would likely be preferred in Alaska and the reliability of individual home tuners.

* * * Recommendation * * *

> The State should thoroughly investigate the viability of over the air BDC systems, comparing their performance and cost with cable systems. In particular, the possibility of a demonstration project (perhaps at no cost), should be pursued.

- Multi-channel, multi-directional microwave distribution units could be used as a single central distribution center to local television plants in clusters of neighboring communities.

* * * Recommendation * * *

> The State should investigate the applicability of such systems.

- "Direct Broadcast Satellites" (DBS) sending signals received directly by individual homes are a de facto phenomenon presently, although direct broadcast is not yet the intent of the program services, and will be a future fixture. That DBS will be a major factor in rural Alaska seems unlikely due to a combination of economic (insufficient subscriber pool) and technical (weather interference and signal strength) elements.

Several other technical concerns are noteworthy, particularly the spread of digital telecommunications technology and the advent of stereo and high definition television. Some current technologies, such as cable, may have difficulty adapting to these innovations.

* * * Recommendation * * *

The State should consider closely any opportunity in redesign of its television system to embrace digital equipment. Alternatives for delivery and distribution should be evaluated, in part, on their capability to adapt to innovations like stereo and high definition television.

D) Look Angles and Radiated Power

While satellite communications channels are essentially "transparent" to different signals, satellites must meet certain basic criteria to be suitable for use in an Alaskan system. They must be visible (have a good look angle) to earth stations across the state and the strength (radiated power) of their transmissions must be sufficient to send an acceptable signal to those stations. This section includes a table listing likely candidates as possible replacements for Alascom's Aurora and an illustration of orbital positions.

Chapter II

FUTURE TECHNOLOGY: OPTIONS AND LIMITATIONS

The fundamental concerns that must be considered in relation to future options for the delivery of State sponsored television are twofold:

1) What delivery systems are now available or will be within the near future and how do they compare, in terms of performance and survivability, to the present system?

2) How will the evolution of technology, as well as it can be foreseen, impact the survival of the current delivery system or possible alternative designs?

A) How Does It Get From Here To There?

Initially, the most important element of the long term viability of any television delivery system would seem to be the impact of expected changes in satellite telecommunications technology on the satellite system (including earth stations) itself. The two State networks are generally accepted as unique enterprises in the United States and perhaps the world. The delivery systems, as configured at present, and in particular Alascom's satellite portion, are very near to state of the art status. However, unless the State should choose to own and operate its own satellite system, it will be insulated to a great degree from the winds of technological obsolescence and advance. As it stands now, Alascom is the entity which must most carefully monitor the development of satellite telecommunications and keep its systems modern and cost efficient. As Peter Sokolof, Chief of the Alaska Public Utilities Commission's Engineering Section, put it: the State need not concern itself with the intricacies of how the signals it produces move from point to point (and this applies to all telecommunications services), but its concern rather should be with the proper processing and distribution of those signals at those points.[5] George Shaginaw, vice president of Alascom, also emphasized that his company's telecommunications facilities, at least to this point, are independent and designed to be able to deliver programming of any source and configuration, regardless of the manner in which the satellite system may evolve.

That a means of transmission will be available is firmly assured at this date. Even if that system is not the most modern and cost efficient possible, two factors suggest that the State will still be at an advantage.

- The State telecommunications budget is large enough so that if the carrying system became obviously inefficient, outmoded, or unresponsive to the public's needs, incentive would exist for the introduction of competition for the State's business. This is not as far-fetched as it might once have seemed, as evidenced by the entrance of GCI into the interstate voice communications market in Alaska.

- Even if an obsolete system cost the State more to use than a newer, more efficient one, the ultimate cost of upgrading that system, now and in the future, would rest with the system owner and costs, both for operation and renovation, would be shared by all users.

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Generally speaking, engineers and planners for a variety of telecommunications agencies voiced the opinion that future movement in the satellite telecommunications industry would be towards compression of video, audio, etc. signals into narrower and narrower frequency bandwidths, thus increasing the capacity of satellite transponders to relay such transmissions from downlinks to uplinks. Both the telecommunications planning and operating divisions of the Alaska Department of Administration (ADOA) have stated that the dual transmission proposal that has bounced about the state for some five years is but one wave in the tide of the future. Neither foresaw changes in telecommunications technology that might render dual format operations obsolete within the foreseeable future (five plus years), particularly in Alaska. Both pointed out that Alascom has made a substantial investment in a satellite system utilizing current state of the art technology and neither source expected change for economic, as well as technical, reasons.[6] Alascom agreed with the preceding view, particularly the second point, stating that the Aurora Satellite was designed with a ten year functional life span and cost amortization period in mind. Alascom has no plans to introduce new satellite technology until the beginning of the next decade at the earliest. (The same sort of parameters apply to Alascom's earth stations.)[7] It seems reasonable to assume that, even were an unexpected technological breakthrough to occur tomorrow, Alascom would not introduce new systems prior to the amortization of current ones. Alascom has filed applications with the FCC for the construction of two new satellites, one for launch in late 1986 and another as a backup spacecraft. These spacecraft have yet to go to bid, so Alascom did not want to speculate on the possible differences between them and Aurora, but the feeling expressed was that they would likely basically duplicate that satellite.[8]

At least one expert, Dr. Robert Merritt of the University of Alaska, a pioneer in Alaskan telecommunications, has predicted that Alascom may replace Aurora with a "hybrid type satellite," one that carries transponders both in the C and the KU bandwidths.[11] Aurora's transmissions are in the C band, 4-6 gigahertz, and services in the bush are on that bandwidth. If Alascom's future spacecraft are designed to reflect KU band signals (see the next section for a discussion of the general implications of KU band in Alaska), it is possible that service to the bush, and not only for television, could suffer. The State may want to ensure that adequate service in C bandwidth is available on the next satellite Alascom launches, particularly if the current system is unchanged. Alascom, incidentally, has no known plans to abandon or reduce C bandwidth capabilities.

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Predictions

We interviewed several independent satellite telecommunications experts to confirm predictions of the future viability of various delivery modes and to develop a general picture of impending directions in the field.

- Jeff Charles, Research Fellow at the Institute for the Future, a California based "think tank" associated with the Rand Institute, currently doing audiographic teleconferencing consulting work for the North Slope Borough.

  Mr. Charles affirmed that the state of the art of satellite telecommunications technology was moving towards increased use of transponder capacity and multiple use of the same frequency bandwidths. He did not foresee impending obsolescence for this field in the near future, i.e. prior to the 1990's.[10]

- Pascal Mukasa, an engineer for Intelsat, the international non-profit agency which owns and operates all international telecommunications satellites in service in the western and the third worlds.

  Mr. Mukasa agreed generally with Jeff Charles. He stated that compression of video bandwidths was the future of satellite technology now and that he did not foresee any developments or problems that would quickly render compression technology archaic. He added that the movement towards digital systems would gradually be all encompassing.[11]

- Dr. Robert Merritt, who has been part of the developing structure of satellite telecommunications in Alaska since its genesis in the mid-seventies.

  Dr. Merritt pinpointed increased use of available bandwidths as the future tide. He also emphasized the proliferation of KU band satellites and the growing trend towards digital communications.[12]

There was, thus, basic agreement on what to expect in satellite telecommunications over the next decade. None of the individuals questioned felt that imminent innovations in the field would have real impact on the State's ability to deliver television programming to the public. Any exceptions to this consensus will be noted in the appropriate sections.

B) The Means of Delivery and Distribution

A number of impending technologies or possible new applications of existing technologies are briefly discussed in this section. This discussion does not exhaust the list of technological options now or in the near future available. It does address the major trends in television delivery and distribution and some less significant ones that have been noted as promising for Alaska by individuals or organizations conversant with the unique problems and conditions here. More details concerning each of these systems will be found in the ensuing chapters on systems, programming, and costs.

1. Dual Format Transmission and Reception: The proposal that the State restructure its current satellite delivery system for ITV and TVP programming has received new attention of late. During the 1984 legislative session some time was devoted to evaluation of the proposal, which called for conversion of the current system from one transmitting each network's signal via a satellite transponder (two transponders total) and thence to earth stations to one compressing and combining the two signals (dual format) and transmitting them to earth stations via a single transponder.

   The scheme to retrofit the existing delivery system was originally discussed as early as 1979. The telecommunications technology now available in Alaska is advanced enough, at least theoretically, with Alascom's more powerful satellite, Aurora, to permit dual transmission statewide. (Commercial network programming originating in the continental U.S. has been sent to Anchorage in that format on an occasional basis.) The conversion of the existing system to allow dual transmission to rural communities would be a relatively simple operation. About one year would be required to retrofit the two Anchorage tape delay centers (TDC's) to transmit dual signals via an Alascom uplink to a single transponder on Aurora and to replace and/or modify the receivers for ITV and TVP signals at each earth station.

   Such a system has not, however, been tested in rural Alaska and as a consequence, a number of questions concerning technical performance and reliability have surfaced. (More detail on the entire dual transmission issue is available in an April 23, 1984, memorandum authored by this agency.) Briefly, they are as follows:

   a) Signal Quality: The most important technical issue is the effect that conversion to dual format will have on the ultimate quality of television picture. Although Alascom and Division of Telecommunications Operations (DTO) engineers have indicated that signal quality will not be appreciably affected, both confirm that only testing would firmly demonstrate system viability. The Alaska Department of Education (ADOE), Learn Alaska Network officials, and Dr. Merritt have all pressed for testing. Any time a signal is compressed, its quality suffers, since energy formerly transmitting a single signal must power two. In addition, the dual transmission format in Alaska was originally conceived with 10 meter satellite dishes in mind; these antenna can pick up a weaker signal more readily than the 4.5 meter dishes used in the bush. Reception quality now in some locations is near the margin,[13] although Alascom and DTO both assert that degradation of signal quality should not result in a noticeable change in picture to the average viewer. Alascom's cost analysis does, however, include retrofit for signal improvement at several sites. Alascom has indicated that the dual format signal could require beefed up earth station maintenance.[14] Dr. Merritt has voiced a belief that signal strength will be inadequate, as have Learn Alaska officials.

b) Compatibility of Dual Format and Teletext: The University of Alaska Instructional Telecommunications Service (UAITS) which produces the Learn Alaska Network, is engaged in a teletext demonstration project. Teletext is a method of telecommunicating textual data via the vertical blanking intervals (VBI) which intersperse the lines forming a television picture. Teletext is transmitted simultaneously with a TV picture without affecting that picture. Teletext will constitute an additional draw on the power of TV signals, which may be near the margin of acceptability in places. Alascom's engineers have indicated that conversion to dual format will degrade teletext transmission, but only negligibly. Again, only field testing will provide definite answers.

c) Occasional Uplink Service: LAN officials have expressed concern that the network's ability to provide occasional television uplink services, for example, coverage of the Iditarod Race, may be affected by the dual format conversion. Occasional uplink capacity is possible at some twenty midroute earth stations (those with ten meter dishes), with a portable equipment package which modifies receive only earth stations to provide transmission capabilities. Alascom has indicated that a modification to the package will preserve this ability.[15]

d) Use of Dedicated Transponder for PBS Uplink: Recently the Alaska Public Broadcasting Commission (APBC) has tentatively explored the possibility of using a State dedicated transponder as an uplink for public radio. APBC seeks to offer radio service to an increased number of rural communities by "piggybacking" its audio signal on a television signal beamed to communities with ITV or TVP downlinks. While such an arrangement is possible in a single signal system, the dual mode's narrowed bandwidth could not carry an additional audio signal without its intermodulating with the television signals, distorting both.[16]

e) Occasional Use Transponders: Occasional use of an additional Aurora transponder occurs now in bringing live programming to the State when both transponders dedicated to ITV and TVP use are engaged. A number of sources have asked whether dual transmission would require that both channels originate from the same source. In fact, dual transmissions from separate sites in Alaska have occurred in the past.[17]

f) Post Reception Signal Strength: Officials from the Learn Alaska Network have expressed reservations about the ability of the current system to acceptably relay signals downlinked from a combined use transponder via the Low Power Television (LPTV) transmitters used in rural Alaska to individual television sets. Engineers from Alascom, DTO, and University of Alaska all concurred that, so long as an acceptable signal was received at an earth station, the remainder of the system should prove adequate to provide a good signal to the average viewer.[18]

g) Earth Stations Outside State System: A number of sites, mainly private homes, oil rigs, and military bases, now receive ITV and TVP programming on individual satellite earth stations. A dual signal format would require a retrofit of such equipment. Earth stations at military sites and oil rigs are portable units leased from Alascom, which would make the required modifications. Privately owned stations would have to make their own modifications. The total number of private home stations in the State and potentially affected is unknown.

A dual transmission system, in and of itself, would present no greater obstacle to the ability of the State to respond to future technological developments than would preservation of the current system. The only case in which the flexibility of the State would be impaired would be a situation in which a new option chosen by the State required a return to single signal format transponder use. In that case, a conversion to the dual use system would have to be undone.

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2. Direct Broadcast Satellite (DBS): This is not a new technology, but one that has been developing over time. DBS systems

beam television programming directly from orbiting spacecraft into individual homes equipped with simple earth stations, consisting of a satellite dish and low noise amplifier. (A low noise amplifier takes its name from the thermal noise it generates while amplifying weak satellite signals; the lower the noise the better the amplifier.) In actuality, many people in Alaska and other locations with privately owned antenna are receiving direct broadcasts, unauthorized by the sources. Some subscription services are scrambled now and it is likely that the major networks and subscription services will begin to scramble their signals in the near future, making them indecipherable to all unequipped with descramblers. A widely spread, operational DBS system could consign other formats to obsolescence, primarily because each user would have the ability to select programming. Several experts have identified it as a coming technology. An independent study commissioned by ADOA recommended that development of DBS not be relied upon, however, since there are special problems for Alaskan reception.[19] Alascom's Aurora, which is the only satellite in position to offer DBS, is not powerful enough to do so. DBS requires a high powered, KU band (see below) transponder satellite, and is most effective with spot beams directed at large metropolitan areas (as is being done now in parts of the continental U.S.). Alaska's northern latitude and scattered population would require more than one satellite if rural viewers were to be included in the "footprint" (area in which transmissions can be received), which is probably not economically feasible with the small pool of paying customers to be found in the bush. The cost of home dishes is also relatively high now (see chapter on alternative delivery systems and costs), although it will decrease in the future.

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3. Cable: While not a new technology, a cable system would represent a new application in the majority of bush communities. More than eighty Alaskan communities (See Appendix I) do have their own systems at this time or are in the process of planning or construction. ADOA regards this as a viable alternative for television delivery in the future and has advocated it as a vehicle for extricating state government from the entertainment business. The department has suggested that cost to the State would be relatively modest if communities had their own facilities[20] (perhaps through capital grants from the State) and that operating costs were a local responsibility. Division of Telecommunications Operations' Director Mel Hoversten believes that cable is a state of the art technology which offers programming variety, local access, and, potentially, viewer interactive services.

All of these options are in place in rural Alaska now. A number of commercial channels (usually up to 12) are available on many of the cable systems listed in the appendix. Local access for video productions is found in communities like Nome, Emmonak, and Pilot Station. In its most basic form, local access requires nothing more than a camera and a video recorder, set up to allow preemption of satellite transmissions on demand, be made available to local residents. Interactive capabilities are in place in a few communities now, Pilot Station for one. The technical modifications to a standard cable operation to allow two-way transmission and reception are relatively minor. Two-way amplifiers will split the cable bandwidth into upstream and downstream flows. Some redesign of individual systems may be required to accommodate this change. Costs for this part of the operation are low; the costs and technical problems are associated with the uses of the interactive system. Such uses can range from simple keypad interface for electronic shopping to computer networking. As the complexity of services increase, so do the costs and technical problems. Gathering noise caused by the flow of input from home access systems to the headend (central satellite signal reception and distribution facility) is a typical, though not insurmountable, problem in larger systems.

Cable operations, particularly in Western Alaska, may suffer from the same sort of satellite reception problems that exist in the delivery system for ITV and TVP, but for different reasons. Cable programming is received from different satellites, such as the Westar or Satcom spacecraft, which do not beam transmissions directly at Alaska, as does Aurora. As a result, larger antennas and lower temperature low noise amplifiers (LNA) may be required to secure good reception. According to Chuck Schumann of Alaska Cable Systems, who has installed several community cable plants, six meter dishes are on the margin of acceptability for reception and standard 80° LNA's may require more expensive lower temperature replacements. The extensive "outside plant" of cable systems (cable, line amplifiers, etc.) also presents the potential for costly maintenance problems (see chapter on costs), although in actual experience, costs may be less than anticipated.

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4. KU Band Transponders: As noted in the discussion of DBS, KU band transponders would be required for that service. KU band transponders are higher frequency (14-16 GHz) and higher powered than the C band (4-6 GHz) currently in use in Alaska. That power requires a greater capital investment, although this is offset to a minor degree because smaller dishes can be employed to receive the stronger signal. This investment can be profitably made in large market metropolitan areas. Several sources have testified that Alascom's C band transponders and other equipment are state of the art and perfectly adequate for Alaskan use.[21] The primary benefit of KU band's power and directionality is that it results in a cleaner signal on the ground. This is important in the continental U.S. where radio

and other signals abound, but since there is a comparative lack of such interference in the bush, the advantages of KU band are not yet necessary.[22] Additionally, since most of the potentially interfering microwave signals in Alaska are transmitted on Alascom systems, any problem could be internally handled by that firm. Lastly, KU band transmission are more susceptible to interference as a result of rain and snow, not untypical Alaskan weather conditions, than are C band signals. Alascom feels that so long as C band provides adequate service, there is little reason to switch to KU band.

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5. Compressed Video: The dual transmission proposal is a part of the general movement in the industry to compress video to smaller and smaller frequency bandwidths in order to increase the capacity of individual transponders. Development is at least a decade old, however, and is still moving slowly.[23] While it is a viable technology, additional compression would require change in the delivery system whether TVP and ITV are transmitted separately or via dual format.[24] The economics of applications in Alaska are seen as unfavorable as a result and the quality of picture obtainable on 4.5 M dishes is unknown as our earlier analysis of dual format indicated.

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6. Block Down Conversion: Block Down Conversion (BDC) is a relatively new application of existing technology, that a variety of sources in the industry believe will mushroom quickly. Block Down Conversion refers to the basic "trick" involved in this process. The normal television signal bandwidth transmitted by a satellite is "blocked down" from its standard microwave bandwidth to the ultra high frequency (UHF) bandwidth. A single receiver at an earth station can handle 12 or 24 blocked down channels. A boosted strength signal is then distributed, either via cable or over the air, to an unlimited number of individual homes. Each of these homes must have an individual tuner/demodulator in order to receive the signal, which is effectively scrambled by the process.[25] Costs, as outlined in the appropriate chapter, appear to be competitive with alternatives such as cable.

   Currently operating BDC systems, which serve mostly apartment, hotel, or condominium complexes and are delivered via cable do not provide definitive answers to several technical questions. The signal sent from the headend of a BDC plant is weak and in need of amplification if sent over the air. The same line of sight reception rule that applies with the present system is in order also. Cable line loss is an important problem with weak signals and could require increased cable size in compensation. Whether cable or over the air distribution is utilized will depend on the physical layout of a community. It is believed that over the air broadcast will be more economical for distances of one mile or more, which would suggest that means of distribution would be best in Alaska. Cable maintenance costs also are eliminated. New, higher powered transmitters, which could solve distribution problems, are being tested and developed at this time. We have, at a late date in composition of this report, received information that an experiment involving over the air transmission of blocked down signals in rural community television systems in Mexico has just begun. An in-progress Division of Telecommunications Services (DTS) analysis of BDC technology will likely carry a favorable evaluation of its potential for Alaskan use.

Anderson Scientific, which is at the leading edge of BDC technology (other manufacturers include Winegard and Channelmaster), recommended that a six meter dish be utilized, which could require that 4.5 meter dishes in use in the bush be replaced (which would be necessary in any event at Alascom sites in order to receive a satellite carrying sufficient programming variety).

Some question has been raised concerning the potential problems of maintaining tuners in individual homes, several sources suggesting that most of the low cost tuners on the market do not have good reliability records.[26] Interviews with five retail dealers and distributors of Anderson Scientific equipment, which is still relatively new, supported Anderson's claim of 98-99% reliability, particularly praising that figure in relation to the unit's low cost. Even at that rate, if there were some 10,000 receivers in the bush, it could mean that 100-200 units would have to be replaced. Repair logistics and costs in rural Alaska could be difficult, whether the responsibility of subscribers, the local organization, or the State. A significant development in this field is expected soon from some major television manufacturers, who have designed sets with built-in signal tuner/demodulators. Since over the air systems of any size in truly remote settings have yet to be tested, all of these questions await definitive answers.

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7. There are a few other technological developments or applications that may, sooner or later, have significance for television delivery and distribution in Alaska. Briefly, they include:

    a) Technology like the Hughes AML (Amplitude Modulated Link) or the Channelmaster Microbeam, which are microwave transmitter systems capable (in the case of the AML) of simultaneously sending as many as 60 channels in multiple directions with an effective range of twenty to thirty miles may have a future in Alaska. It utilizes technology similar to block down conversion equipment, can handle all manner of signals in addition to television and is compatible with interactive cable functions. A single facility would be utilized to send signals to a network of community cable headend plants. DTO considered the AML when designing the Anchorage-Girdwood microwave link, but rejected it as a result of its cost ($100,000) and its susceptibility to interference from rainfall (although Hughes literature indicates that it performs well in rainy climates). Similar systems have been used in many rural areas and large communities worldwide and the AML may have cost effective applications in Alaska in areas where communities are close enough together so that microwave repeaters are not needed. In correspondence with DTO, Hughes has indicated a willingness to do preliminary feasibility studies at no cost.[27]

b) Multiple multi-distribution systems (MMDS) are an adaption of the original pay TV system with individual subscribers receiving direct, scrambled signals from a provider for a fee. Up to four channels can be offered. An Anchorage group is looking at such a system now, but its feasibility in the bush is questionable due to its expense and high maintenance costs.[28]

c) Development of digital format technology has been in the works for better than a decade. Digital technology converts video picture information into computer coded bursts providing better quality of signal and utilizing a narrower bandwidth than current analog signals, which essentially consist of constant waves of information. The industry has yet to go digital, however. Alascom's equipment is still mostly of the standard analog variety, but the company appears to be gradually going to digital technology as the opportunity presents itself. The LPTV's in villages now are analog instruments and probably would continue to be so. A digital signal sent to them would be converted back into analog format prior to broadcast. Digital television sets which convert analog signals into digital signals will be available this fall. Professor Merritt has opined that, were the State beginning today to design a telecommunications system, digital technology would "be very attractive for most applications."[29]

d) Stereo Television will be a reality, at least on a limited basis, this fall. The FCC recently set standards for broadcast of the signals, but decoders or stereo ready TV sets will be required for home reception. The cable industry will find itself in something of a technical tight spot as stereo broadcasts become widespread, because its practices will not be compatible with the requirements of stereo television sets. Stereo sound now is provided for cablecasts via a separate, optional hook-up, at additional cost, to a subscriber's audio system.

e) High Definition Television (HDTV), also known as High Resolution Television, is a coming technology that will provide pictures of clarity and depth far surpassing today's version. HDTV will accomplish this by dividing pictures into twice as many horizontal lines as typical pictures. The FCC has declined to set broadcast standards and, until the market sorts out the preferred methods, HDTV will be a technology unavailable to the general populace. HDTV signals will require a broader bandwidth than current transmissions and may force the revision of FCC broadcast standards established in the 1950's.

C) Look Angles and Radiated Power

The importance of satellites for television delivery in Alaska must not be underestimated, despite our earlier comments on the basic "transparency" of such means of communication and the need to focus on the end points of signal origination and distribution. Not all of those transparent channels are available to Alaskans without restraint; the sky is not the limit. For each spacecraft, the two significant details that determine whether television or other signals can be successfully delivered within Alaska are:

1. Look Angle: The angle of elevation of an earth station antenna required to "look" at a particular satellite. Generally, an elevation of at least five degrees above the local terrain is desired in order to minimize interference caused by thermal noise produced by the earth. Look angles are determined by a satellite's orbital arc. In northern and western Alaska an angle of 5° may be difficult to obtain as all satellites are in equatorial orbits (see accompanying illustration) and many are positioned to service the continental United States primarily .

2. Radiated Power: The strength of the signal beams emanating from the transponders of a satellite are of particular importance for Alaskan reception, again because of the customary positioning of American telecommunications satellites. The full descriptive term of measurement is Effective Isotropic Radiated Power (EIRP) and measurements are calibrated in decibels in relation to watts (dBW).

Whether a satellite has a usable "footprint" in the state depends primarily upon these two elements. There are currently 51 American and Canadian commercial communications satellites in orbit. Alaskan receivable satellites are listed in Table I, "Satellites With Suitable Alaskan Footprints" and their orbital positions graphically displayed in the illustration on the following page. Without forgetting that there are a number of other technical factors involved and that the EIRP of a particular satellite varies by several dBW across the state, we can say that for a transmission to be usable statewide in Alaska, it must have 32-33 dBW of radiated power.[30] This is based on the reception capabilities of the common bush earth station with a 4.5 meter dish and 80° low noise amplifier. Satellites with "insufficient" power ratings are included in the table because transmissions from some spacecraft may be received in Anchorage (and other communities in a less westerly geographic location) and retransmitted to rural communities, as is done now. In addition, a communications satellite's geosynchronous orbital

Table I

Satellites With Suitable Alaskan Footprints *

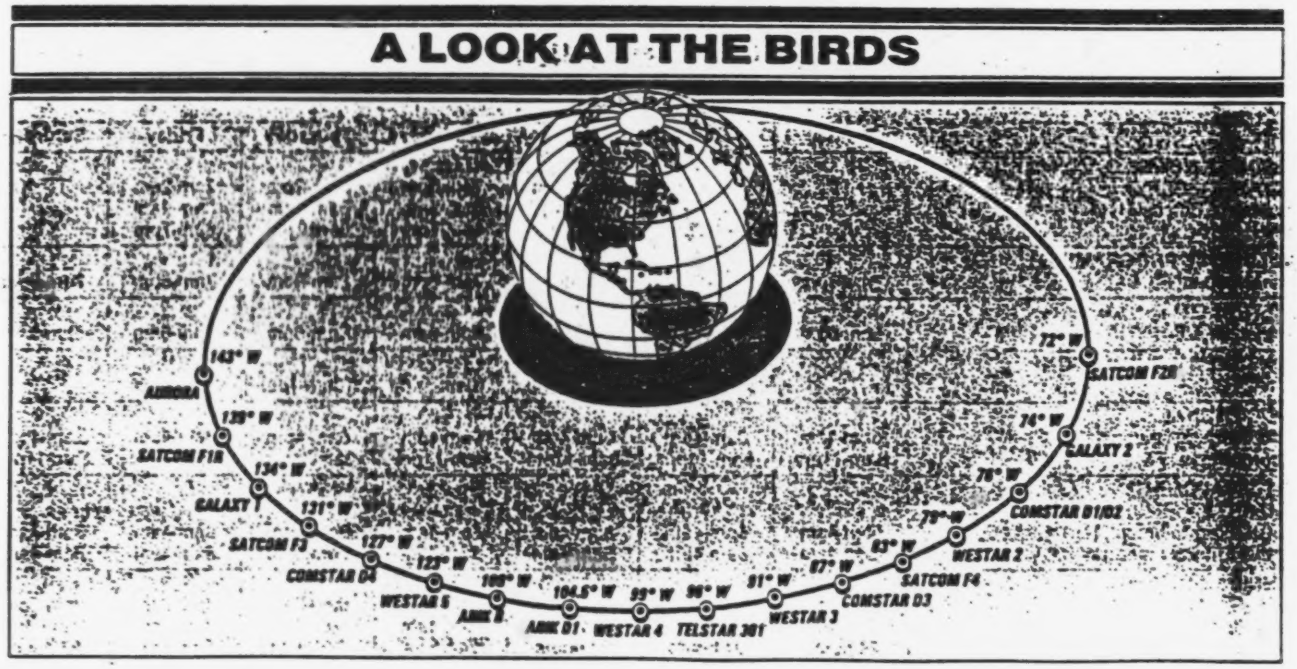
SATELLITE	ORBITAL ARC	RADIATED POWER	RECEPTION AREA
Aurora	143°	38 dBW	Statewide, weak in Aleutians
Westar IV V	99° 123°	31 dBW	Received now by Alaskan PTV
Satcom F1 F2 F3 F4	139° 119° 131° 80°	33 dBW	F2 precursor to Aurora, weak in Western Alaska, F3 degrading
Comstar D3 Comstar D4	87° 127°	33 dBW	D3 Anchorage OK, likely problems elsewhere
ANIK D	104.5°	33 dBW	Statewide, weak in Western Alaska
Galaxy I	134°	30 dBW	Received in St. Mary's
Telstar 301	96°	33 dBW	Anchorage OK, weak in Western Alaska

* All satellites listed carry 24 C band transponders.

Source: EPIC Engineering, State of Alaska Television Delivery Alternatives Study, January 1984; ADOA, Satellite Television Alternative Study, April 19, 1984; Phillips Publishing, 1984 Satellite Directory, 1984; Interviews - Northrip, APBC, 6/22/84; Guy, ADOA, 6/21/84; DTO Staff, 6/29/84, 7/2/84, and 7/30/84.

arc should be west of 90°, in order for a good look angle to be available in western Alaska. Even Aurora in the 143° west slot is not perfectly received in the Aleutians. Easterly flying craft can be seen in much of the eastern portion of the state.

The chart indicates that there are several satellites currently receivable in Alaska. Several more are due to be launched in the near future. However, only three of those charted meet the minimum level of power required for adequate reception at bush earth stations. Aurora certainly is the standard against which the others must be measured, with its combination of high powered spot beams and far western slot of equatorial orbit. Apparently the Galaxy I bird, despite its relatively low EIRP can be well received in St Mary's (the United Utilities community cable system there has its dish aimed at that satellite). It does have a relatively far western orbital slot. Comstar and Telstar transponders can be acceptably received in Anchorage, where national broadcast network affiliates will be taking feeds from them.


A LOOK AT THE BIRDS

Source: Satellite Orbit, "Birdwatcher Program Guide", July, 1984, p. B3

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Chapter III

Summary and Recommendations

SYSTEMS IN THE PRACTICAL SENSE

This chapter is the core of our study and addresses three basic questions:

> Are the technological options available practically viable?
>
> Will alternative systems allow the State to terminate its involvement in the Television Project (TVP)?
>
> Are alternatives affordable to and manageable by local residents?

A) The Crux of the Matter

We do not directly address the basis of the public interest surrounding the provision of TVP to Alaskans. It is an important issue, but not one truly amenable to analytical treatment nor related to our charge to review technological alternatives.

B) How Abhorrent is a Vacuum?

If TVP had never existed or ceased to exist, would rural Alaskans be bereft of entertainment television? Some seventy rural communities now have local television plants in operation or planned. These are both community owned and private enterprises. A few communities with fewer than 100 residents have their own systems. It appears as though more and more community owned cable or other plants will be penetrating the bush in the near future, if recent experience holds. At least one Alaskan cable industry firm has plans to extensively canvas the bush to locate communities to add to those in which it already has systems. Just which villages can confidently count on being included in this boom and which will have to continue to depend upon publically subsidized television is uncertain. One could assert, with some assurance, that many of the villages in the 300 to 400 population range which now rely on TVP for recreational TV will have other sources in the future, with or without TVP. Below the 200 mark, 87% of which communities are without commercial television, it is much more difficult to make such a prediction.

* * * Recommendation * * *

> An assessment of the likelihood of further penetration of private sector or community owned televisions systems into rural Alaska should be a part of any decision process aimed at determining whether and to what extent the State of Alaska should continue to be involved in the provision of entertainment television.

For purposes of comparison with the options listed in following sections, the expected costs of continuing the present arrangement, for the Television Project alone, for FY 85 - FY 94 are:

$35,579,000

C) The Administration's Options

The Alaska Department of Administration (ADOA) has investigated a number of alternatives to the current system:

1) Their unofficially preferred option aimed at getting the State out of the business, is to provide 3 channel cable systems to 166 communities through capital grants totalling about $16,250,000. Programming, maintenance and operations could then be local responsibilities. The State would stand to save up to $4.6 million in annual costs. Ten year recurring costs are variously pegged at $7,500,00 for State maintenance or $14,300,000 for the private sector.

2) Retransmission of a "super station" like Atlanta's WTBS over the current system would entail essentially the same costs to the State as are incurred now (about $32.6 million over ten years). This would be a unique arrangement that would require negotiations with the station involved. The State would likely have to continue its support.

3) Direct transmission of a super station to bush earth stations. A number of new earth stations would have to be built (estimated cost - $6.5 million), recurring costs would about a tenth as much as the previous option, but the State may also have to pay termination liability charges of $1,000,000 to $2,000,000 to Alascom. State involvement would probably persist.

4) A combination of the first and third options, with cable systems being built after two years, multi-point distribution systems, and community systems based on programming received from a Canadian satellite were also considered. The Canadian alternative would preserve State involvement, while the first two ideas offer little significant advantage over any of options 1), 2), or 3).

* * * Recommendation * * *

> The preferred option of community operated three channel cable systems is the best of this lot, offering the end of State involvement in entertainment television at a significant cost advantage over currently anticipated long term costs, while providing increased programming, local control, and proven performance in rural Alaska.

D) Other Configurations and Options

Other configurations for a new delivery/distribution system include the following major options:

1) Private sector operation of the current system has been considered in passing. Little information is available on this alternative.

2) Dual transmission format could be implemented without impacting other State telecommunications activities. The price for transformation would be about $1.9 million. This would continue State involvement, at some cost savings ($880,000 annually), but would lock the system into its present shape.

3) Conversion of both the ITV and TVP transponders to a dual signal transmission mode would provide four channels of programming. Capital costs would be significantly higher than option 2), at least $7,500,000. State involvement would continue and recurring cost would be somewhat higher than at present due to additional programming expenses.

4) Multiple Systems Operators are cable systems serving several communities through a single earth station. Little information is available on this option, although industry sources state that a public subsidy of some sort would be necessary.

5) Block Down Conversion systems can offer everything that cable systems can except a history of proven performance in environments similar to rural Alaska. They are adaptable to innovations known to be on the horizon. The costs for a twelve channel over the air system in rural communities now relying upon TVP for commercial TV could be as little as $4.7 million dollars. Community grants followed by local O & M could sever the State connection to TVP. Whether the FCC will license such operations, for which it presently has no licensing category, is unknown at this time.

* * * Recommendation * * *

The State can remove itself from the entertainment television business at a long term savings. If it should be affirmed that the provision of commercial television to rural Alaska is proper public policy, then several decisions must be made. The first concerns the role to be played by the State. Should the present system be preserved? Or should the State subsidize the capital and operating costs of a new technological solution. A variation on this theme would make only capital grants available, requiring that operation and maintenance be a community responsibility. Cost factors and the opportunity for the State to disengage itself from this service, while enabling the continuation of the service suggest the latter approach. Still other questions must be answered. Should all communities without commercial television be included in the eventual program or should the State assume that the private sector will fill at least part of the vacuum? Two systems, cable and block down conversion, appear to embody the best alternatives to the present system based improved service and cost savings. The State should be carefully weigh the advantages and disadvantages of the two and support one for rural distribution.

E) Pick A Satellite, Any Satellite

The choice of satellites carrying appropriate programming and that can be received in rural Alaska is of primary importance to any redesign of the present scheme. Satellites must be in view from all parts of the State and have powerful enough signals to be picked up on small earth stations, if directly downlinked. There are about ten satellites that could be used in Alaska depending upon the configuration of the delivery/distribution system. If a new system was to depend upon a new satellite, transponder space would have to be available for the Learn Alaska Network and for other Alaskan productions. Several commercial satellites do have unused transponders available now.

F) Other Options

1) Both the Learn Alaska Network and the Alaska Public Broadcasting Commission seek the acquisition of in-house ability to uplink signals to satellite transponders. LAN's proposal is for a single uplink, costing about $150,000, which would theoretically result in $88,000 annual saving in operations costs. The APBC plan, still informal, calls for uplinks at each of the four Public Television stations in the state at approximately quadruple the cost of the LAN proposal. This concept has received an initially frosty reception at Alascom.

* * * Recommendation * * *

> The possibility of independent uplinks is worthy of some further investigation and possible justification on the part of the interested agencies. Independent uplinks will be necessary if an alternative satellite (to Alascom's Aurora) is to be used for television delivery.

2) Local origination of programming is much desired, by locals and agencies. Cable, BDC and the present system all allow this.

* * * Recommendation * * *

> Decisions on community distribution structures should seek to ensure the provision of public access to program production and distribution facilities.

G) Some Problems

1) Some technical problems inherent in the present delivery system have been identified and are in various states of remedy. A major thorny point is the poor operation of the KYUK translator system, the signal quality of which decreases as new translators are added, extending the signal range.

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2) Procedural problems have delayed the completion of the delivery of ITV and TVP as envisioned by the legislature.

- The FCC licensing process grinds on for about 50 ITV and TVP sites.

- About another twenty-five communities have slipped through the cracks during the process of allocating monies appropriated by the legislature, some as the result of apportionment following executive vetoes.

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3) Several fundamental policy issues have caused controversy. The LAN and ADOA have serious differences of opinion on three significant matters.

- Dispute over technical standards for the reception of ITV has been a live item for some time. This problem seems the result of a perceptual difference concerning acceptable reception quality.

- There is disagreement between the two agencies on whether a formal document specifying their respective responsibilities toward television provision is needed. LAN has repeatedly pushed for a memorandum of agreement in this area, while ADOA has staunchly maintained that such is unneeded.

* * * Recommendation * * *

> These differences should be resolved internally between the two agencies, to their mutual satisfaction. It appears as though better communication would be a significant step in that process.

- Several urban areas, most importantly Anchorage and Fairbanks, are without LAN broadcasts. ADOA has pursued distribution of the LAN signal in these and other areas through cable and other means and asserts that the public most in need of reception has, or will have, it in the near future. LAN seeks to provide universal coverage through full service VHF stations in those communities (at a capital cost of $ 1.7 million). The Anchorage School District and KAKM, the local public television station, both asserted that such a station would be a duplication of services.

* * * Recommendation * * *

> The need for expansion of LAN service to urban areas should be carefully examined. The construction of full service VHF stations may be unjustified, given the alternative provision of LAN programming to the communities in question.

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4) Both ADOA and LAN have stated some serious reservations and questions about the precise nature of their purpose or the future of the networks for which they are responsible, despite the original and subsequents directives from both the legislature and the executive. Each has requested clear statements of legislative intent in those two regards.

* * * Recommendation * * *

The legislature should develop firm and explicit statements on the purpose and goals of both State sponsored networks. These statements should specify task, future goals, apportion shared responsibilities, and eliminate points of contention in areas such as system maintenance and service planning.

Chapter III

SYSTEMS IN THE PRACTICAL SENSE

The Television Project, as it now exists, grew out of a mid-seventies demonstration project, with subsequent annual legislative appropriations funding its continuation and expansion. The Learn Alaska Network followed, beginning in 1982. For the last several years alternative means of delivery of entertainment television to Alaskans without access to commercial broadcasts have been discussed. Given the specialized, public service orientation of the LAN, its inclusion in this discussion must be of a somewhat different nature, for reasons that will become apparent as you read on. The previous chapter limited itself to description of technological alternatives and phenomena. In this chapter, we will broaden that perspective by emphasizing the practicalities of various possibilities, some proposed by the Department of Administration, some by other sources. We have excluded some systems which the analysis of the preceding chapter indicated were unlikely candidates. Additional details may be found in the chapter devoted to system costs. The issues to be addressed include:

1) Is the proposed system workable in a practical sense?

2) Will a particular system require that the State continue its involvement in television provision or will it allow the State to terminate its participation?

3) Will a particular system be manageable for local residents, in terms of affordability and maintainability?

A) The Crux of the Matter

The single issue fundamental to the delivery of RATNET and LAN to Alaskan citizens will be scrupulously avoided in our analysis. That matter is, of course, whether it is appropriate public policy for the State of Alaska to be involved, to the degree it is, in that provision. In part, we do not address the issue because it has been decided already by Alaska's elected representatives, whose duty it is to make such decisions, in part because our charge directs us primarily to the consideration of technological alternatives to the existing system, and also because that decision is based upon perceptions of need and social equality that do not admit to evaluation through our somewhat restricted analysis, limited as it is, insofar as possible, to tangible facts and figures. Phenomena of the social and cultural realm, such as the effects of the introduction of television upon rural viewers have been recently addressed by other researchers (for example, in *Television's Effects on Rural Alaska*, just released by the Center for Cross-Cultural Studies of the University of Alaska) and interested readers are requested to turn to those sources for insight.

B) How Abhorrent is a Vacuum?

Prior to an analysis of the practical advantages and disadvantages of the several alternatives to the current television delivery and distribution system, a most provocative question must be considered.

> If the TVP had never felt the breath of life, or if it were to precipitously lose its sustenance, would a video vacuum in some 166 rural communities and 10,200 households be an unalterable fact of life?

Recall that some 70 rural communities now, or will in the near future, have community television systems, nearly all of them cable, some operated by commercial concerns, others by community organizations. If the TVP was to expire, would commercial interests or local groups begin to fill the void? In other words, is a State role in television delivery to the bush the only means by which to ensure that such indeed occurs?

The answer is one that will defy strict definition. One reason is that it is literally impossible to predict what each of the 166 communities now relying upon TVP for entertainment television would do without that service. Some forty villages and towns (see Appendix I) have community owned cable plants in operation or close to that status. With the advent of relatively inexpensive "turnkey" packages, it is becoming more and more feasible for villages to acquire local systems. A couple of villages with approximately one hundred inhabitants are on the list of those which have already done so or are in the process of so doing. A newly favored tactic for the financing of local television is the pursuit of State grant funds. Some sort of non-profit organization appears to be the principal method of financing operations and maintenance (comparable Canadian villages treat television as a utility and assess a local tax) and monthly subscriber fees are running in the $20 to $30 range. One consultant, who has installed several local plants, has stated that as few as 50 subscribers paying $50 fees could, theoretically, support a non-profit operation.[31] As the capital costs continue to decrease, it seems clear that more communities will follow suit. The disappearance of RATNET would more than likely be an impetus to that. Exactly which communities and when would be difficult to predict.

It is possible to be slightly more precise in regard to what the cable operators industry will be doing in the bush, with or without TVP. Two of the principal operators of multiple systems outside the major urban centers of the Railbelt (McCaw Cablevision and Alaska Cablevisions) believe that villages smaller than their current service locations do not represent an appropriate sort of profit opportunity for their firms and have no plans to attempt to penetrate that market.[32] Sensitivity to competitive advantage could be restraining these companies from revealing their true plans, but both firms (headquartered outside of Alaska, incidentally) put the minimum number of subscribers needed to even have a glimmer of a hope of a profit at 500. That would restrict their scope of operations to regional centers and above, which is essentially where they are now.

A recent instate entrant into the field, United Utilities, has roughly calculated that 70 to 80 subscribers (perhaps 300 inhabitants) could support one of the twelve channel systems (two devoted to RATNET and LAN, even in communities with broadcasts of those signals) which it currently has in four villages with several more scheduled to be turned on in September, 1984.[33] United is pursuing further its analysis of number of subscribers needed to support a plant and may determine that even smaller villages could be profitable. Their current monthly subscriber charge is $42. United operates telephone utilities in 54 rural communities and is examining each of those for possible cable service; probably half will be eventually be selected. United offers four to six channel, locally operated, turnkey systems for installation in communities unable to support its standard setup. The utility's plans do not stop there, however. The remainder of the state will be surveyed for suitable opportunities in a follow-up effort, although no prediction of the outcome of that reconnaissance is yet possible.

For a picture of how local television systems have penetrated the State, Table II is offered for your consideration. It lists community television by source and by local population. A full listing of individual communities may be found in Appendix II. We should begin by noting that our tally of rural communities relying solely upon RATNET for commercial telecasts differs slightly from that of ADOA. The difference, for the purposes of this document, seems insignificant. The numbers in the table tell the story. The smaller the community, the more likely that TVP will be its only source of commercial programming, nearly 87% for those with a population under 200. On the other end of the spectrum, only about a tenth of towns with over 500 inhabitants relied on TVP (only one of those communities had a population of over 800). There are, however, a few of the former communities that do support a local television plant, whether community or commercially owned. Given the state of information on this subject, it is difficult to develop any historical perspective on trends of increase of local operations for any population category. That history is very short and will be subject to change over the coming years as systems and economics change. Relying on the testimony of industry insiders, in combination with the data in Table II, we can formulate some suspicions regarding the future penetration of rural Alaska by community television plants. It seems likely that more and more villages and towns will have systems with time, whether or not they now have TVP broadcasts, and, in all likelihood, that time will be fairly short. About 20 communities have been added to the list in Appendix I since it was last compiled by ADOA in November, 1983. How far down the

Table II

Source of Local Commercial Television*

1982 Local Population	Community Owned	Privately Owned	Other Source#	State TVP	Total
0 - 100 *	4/ 4.7%	2/ 2.3%	5/ 5.8%	75/87.2%	86
101 - 200	3/ 5.1%	-/ -	5/ 8.5%	51/86.4%	59
201 - 300	11/26.2%	3/ 7.1%	5/11.9%	23/54.8%	42
301 - 400	5/29.4%	3/17.7%	1/ 5.9%	8/47.1%	17
401 - 500	3/17.7%	5/29.4%	3/17.7%	6/35.3%	17
Over 500	14/21.5%	33/50.8%	11/16.9%	7/10.8%	65
All locales	40/14.0%	46/16.1%	30/10.5%	170/59.4%	286

The first number in each column represents the number of communities. Percentages should be read across each row.

# microwave and translator systems, over the air reception of telecasts originating in other communities, and six communities receiving WGN via unspecified means.
* Includes several communities with no population listed.

Source: Division of Telecommunications Services, 1984 Inventory of Communication Facilities Serving Alaskan Communities, ADOA, 1984.

scale that penetration will extend is the rub. There are local systems in some very small villages, less than 100 residents. Not many, but where there is one, there could, conceivably, be more. Commercial sources say 70 or fewer subscribers could support a system. Still, it would be foolish to believe that the State could fold the Television Project and expect private enterprise and non-profit groups to rush in headlong. Industry officials have affirmed that such an event would be an impetus to their move into smaller communities, but not a great one.

It seems fairly clear that the majority of rural residents want entertainment television. The absence of TVP broadcasts would likely serve to increase the demand for television from other sources. How that would translate into a proliferation of community systems or quicker penetration by private enterprise into rural Alaska is speculative. It does appear certain that, with or without the TVP, local systems will multiply. It is unlikely that all villages now served by the TVP would have recreational television in the absence of State support. Where the bottom will be, at a population of 200, perhaps more, is difficult to ascertain, being a function of the willingness and ability of subscribers to pay for operating and maintenance costs and of the type of system. It appears as though the current apparent legislative intention, that all communities with twenty-five or more residents have service, would not be realized.

* * * * * * * * * * * *

Before we move to an evaluation of various delivery/distribution options, the long term costs of continuing TVP service will be noted, for purposes of comparison with other schemes. Whether the costs of the already capitalized TVP system can be competitively challenged by the costs of new methods of using that system or of recapitalizing a new network is one of the most crucial questions to be addressed in this section. We limit this analysis to the TVP because the costs of the Learn Alaska Network contain much more than delivery and distribution expenses and because LAN is a network which could not be replaced by commercial sources. Table III lists the TVP costs in question. Obviously, those costs are a not insignificant factor at over $35 million for ten years.

Table III

Projected Ten Year Costs For TVP

Fiscal Year	Operating Funds	Fiscal Year	Operating Funds
1985	$3,637,000	1990	$3,531,000
1986	3,018,000	1991	3,672,000
1987	3,139,000	1992	3,819,000
1988	3,265,000	1993	3,972,000
1989	3,395,000	1994	4,131,000

Total Costs - $35,579,000

Source: Division of Telecommunications Services, Satellite Television Alternatives Study, 4/19/84, p.2; Mel Hoversten, Division of Telecommunications Systems, interview, ADOA, 8/6/84.

* * * * * * * * * * * *

C) The Administration's Options

ADOA's stated goal is to remove State government from direct involvement in the provision of entertainment television to Alaskan citizens. Their preferred alternative (at least prior a just completed trip by DTS staff to Canada to evaluate local schemes there) to the present project is designed to do just that. The basic outline of their position, while not an official one, embraces the following salient elements.[34]

- Communities in rural Alaska without commercial broadcasts or cable systems should have TVP replaced by local cable systems.

- State grants should be made available for the capital costs of implementing locally owned systems. The approximate FY '85 cost would be $16,250,000 for 166 three channel cable plants.

- Programming decisions would be made locally and operations and maintenance would be local responsibilities. More channels would be available if desired by locals. O & M requirements could generate some local employment opportunities.

- The state would save approximately $3,500,000 annually in charges for Alascom services and operations and maintenance costs.

- ITV could be carried over one of the cable channels, resulting in the elimination of Alascom downlink charges, $1,125,700 for Fiscal Year 1985.

Cable systems in rural Alaska are certainly a viable alternative, having been installed and proven in numerous communities. They may have potentially high maintenance costs, compared to other systems, although there is some difference of informed opinion on this subject. ADOA's estimate of maintenance costs over the long term (ten years) for private sector service ($14,300,000) are substantially higher than its estimate of the price of State service ($7,500,000). Problems with any of a number of small items, such as home "drops" or line amplifiers, may shut down all or part of a system. Maintenance problems can be minimized by the use of reliable equipment and adherence to proper installation techniques. In addition, current cable technology may have difficulty handling innovations such as high definition television and stereo television.

A very rough estimate of the costs to an individual subscriber in such community systems can be made based on the expected recurring annual costs and the potential number of subscribers. ADOA estimates FY '86 costs to be from $1,271,000 to $1,917,000, the former with State maintenance and the latter with private. If there are to be approximately 10,500 households receiving service, monthly costs per subscriber may range from $10 to $15. This does not take into account differences in community size or method of operation (profit, non-profit, etc.) of systems. Costs now are in the $20 to $30 range for operating non-profit systems. Costs would appear to be reasonable, even allowing for some profit or unanticipated overhead.

Other options explored by ADOA are listed below. Most of these are possible with technology and systems in use now.

- Continuation of the TVP in its present form: This alternative does not alter the current situation vis-a-vis State involvement in the provision of entertainment services. It would leave the State in the position of continuing its open ended involvement in the continuation of the project. The long run costs to the State ($35,579,000 from FY '85 to FY '94) do not compare favorably to some other possibilities, particularly if costs beyond the initial capital costs of systems are to be made a local responsibility.

- Retransmission of WTBS: This option calls for broadcast of the Atlanta "super station" over existing TVP facilities. WTBS would be uplinked to Aurora in place of RATNET programming. since WTBS is intended for cable distribution, permission would have to be obtained from the station for both satellite retransmission and local over the air broadcast and the Federal Communications Commission would have to be notified. This plan would have little long term cost advantage, at about $32,600,000 for ten years, over the previous one. The modicum of local control of programming now embodied in the RATNET board would be eliminated. State involvement would continue, it seems certain.

- Direct transmission of WTBS: In order to directly transmit WTBS to communities with TVP facilities, the earth stations in those communities would have to be redirected to the SatCom F3 satellite. No impediment to this action exists as far as State-owned earth stations are concerned. In Alascom communities, new earth stations would have to be constructed. Permission for over the air distribution would have to be obtained and the FCC would have to be notified. Two other potential problems occur; first, if the State terminated its use of Alascom earth stations currently downlinking TVP, it could be faced with "termination liability" charges (see Chapter V) of $1,000,000 to $2,000,000 and, second, reception of SatCom F3 signals may be weak in Western Alaska, requiring more expensive earth stations and the satellite itself is nearing the end of its planned life. Capital costs are estimated at $6,400,000 and FY '85 - FY '94 operating costs at $3,500,000. The Learn Alaska Network could continue to be received on existing facilities under both the WTBS options. It is likely that the State would have to continue to sponsor both networks, unless some type of statewide organization of community television systems could be devised or communities were assessed directly by WTBS, based on population perhaps. Both of these alternatives would probably be less attractive to WTBS than State sponsorship.

- Direct WTBS transmission followed by Cable: Another version of the preceding proposal would follow two years of WTBS transmission with the construction of local cable systems. Recurring costs would be $650,000 for two years. Capital costs for the cable systems is tabbed at $15,800,000. Operating costs would be similar to the ADOA's "preferred" system. It would appear that local responsibility for recurring costs would be possible. The State again would presumably continue its role in the system, at least until community cable operations came on line.

- Multipoint Distribution Systems (MDS): A special frequency transmitter sends signals for up to four channels over the air to homes equipped with appropriate converters. Subscription television services in many locales, mostly urban, utilize MDS. Capital costs would be $31,300,000 and ten year recurring costs would be $30,800,000 or $49,600,000, again depending on whether the State or private sector was responsible for maintenance. Such systems could be operated by community organizations. The rough cost per subscriber would be in the neighborhood of $20 to $35, depending on whether maintenance of the system was handled by the State or the private sector, without allowing for a profit or other contingencies.

- ANIK D Satellite systems: The Canadian ANIK D spacecraft has been considered as a possible source of programming for entertainment television in Alaska. ADOA has projected the costs of providing programming from that satellite in a system configuration basically similar to those involving WTBS. The system retrofits would be approximately the same, as would costs. Recurring costs would also apparently be in the same area. Continued government sponsorship of television delivery would be most likely. Recent discoveries by the Division of Telecommunications Services suggests that ANIK programming may not by a viable substitute, for two reasons. The American broadcast network programming now transponded by the satellite may not be longlived, both because there is pressure to replace it with Canadian selection and because CanCom (Canadian Communications Company) does not have permission to uplink the American programming, nor does it pay for it.[35]

D) Other Configurations and Innovations

- The Epic Engineering study recommended that the possibility of private sector operation of TVP be investigated. While no estimate of costs or discussion of the operating parameters of this option were made, the study did note that both Alascom and Multivisions of Anchorage have expressed some interest in such an alternative.[36]

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- Dual Transmission Format: Conversion to a dual format transponder system, at a onetime cost of $1,905,000, would require the State to rent only one dedicated transponder from Alascom rather than the two leased now. Annual savings to the State would be $880,000. The cost of conversion would be recovered in somewhat more than three years following an appropriation for that purpose (allowing for a one year transition period). Converting to such a system would in no other way alter the State's connection to the delivery of television and would result in only a 4 to 6 hour service outage for each community as receivers were replaced or modified.[37].

The dual format proposal is the only option considered herein which affects the satellite portion of the television delivery system. Despite this, it will have no effect on the State's other uses of satellite telecommunication.[38] A single transponder can handle a number of audio and data transmissions, along with one television signal. Under dual TV transmission format, the full bandwidth of a single transponder would be utilized, leaving no space for other message functions. State transponder use in categories other than television is currently switched from transponder to transponder in response to traffic patterns and thus would be unaffected. That traffic is not nearly sufficient to utilize the full capacity of a transponder. The dedication to State use of a transponder for telecommunication functions other than television (and toll telephone) would be cost inefficient.[39]

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Another Approach

An informal suggestion by Charles Northrip, APBC Executive Director, for redesign of the delivery scheme of State sponsored television has its inspiration in the original proposal for a dual format transponder system and in the APBC's desire to extend public television to the bush. The State has allocated significant funding for the provision of public television, around $17 million dollars since the early seventies.[40] Northrip believes that any discussion of a reconfiguration of satellite television delivery should include public television (PTV). At present, a full channel of PTV is delivered, via a microwave feed of Juneau's KTOO, to several Southeastern communities. Northrip's proposal, in bare terms, is that the State convert both dedicated transponders to dual format, making four channels available to viewers. The proposal would keep the State involved in both projects. Interviews with Alascom and ADOA engineers have confirmed that there would be little practical difficulty in effecting such a change. The result would be a virtual duplication of the current system, as antennas, receivers and low power transmitters would have to be installed at each site. The earth stations in use now would not have to be replaced, assuming that programming for all four channels was downlinked from Aurora. Other satellites do have the capacity to handle dual format transmissions and transponder space is available.

It is probable that all communities with ITV or TVP earth stations would have to be transformed. On that basis, some relatively rough estimates of the capital costs of converting to this alternative have been made, with the assistance of Alascom and ADOA.[42] The minimum cost would be in the vicinity of $7,500,000 and the maximum would be about $10,900,000. The costs for the retrofit could conceivably reach the higher figure, if conditions in various communities in regard to geographic layout and airwave congestion required more powerful transmitters or UHF transmission. Operating costs to the State would surely increase somewhat in the production and uplink of another two networks.

Included in Mr. Northrip's wishlist is the ability to uplink programming from the four PTV stations in Alaska. APBC's engineers have estimated that the retrofit necessary to do this would cost int he area of $150,000 for each station, or $600,000 total. This particular facet of the plan may run into some problems at Alascom, which has indicated some resistance to allowing other entities to uplink to their satellite (see Other Options). Other satellites are available, but that course would again require the construction of new earth stations at Alascom owned sites and the installation of a new dish at State owned sites, if more than one satellite was employed as a programming source.

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- Multiple System Operators (MSO): Several cable operators have suggested that the MSO concept offers a viable means of delivery of television to the bush.[42] The MSO, which would have to acquire a certificate of public convenience and need from the APUC, as would any other cable operation which charged for its services, provides service to a number of communities from a centrally located earth station facility. Satellite transmissions to this central site would be disseminated to other communities via a microwave translator network or a system like the Hughes AML or Channelmaster Microbeam, depending on the layout of the region. Clark King of the Alaska Cable Television Association has suggested that an area like the NANA region would be an ideal spot for an MSO with Kotzebue as the central facility site. He is also of the opinion that an MSO would require some level of public subsidy. No calculation of the overall costs of substituting a number of MSO's for the current systems has been made. Closely akin to this idea is another notion mentioned by King, that being a systemwide management and operations contract for any State sponsored replacement for TVP which consisted of local cable plants. Economies of scale could be attained by contracting with an experienced operator, presumably on a bid basis.

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- Block Down Conversion Systems (BDC): BDC community television systems are a recent phenomena and are still undergoing development. Various arrangements have been tested in the Caribbean, U.S., and Canada and actually put into limited operation in some states and foreign countries, Sri Lanka for one, with new installations on tap in New Guinea, Brunei, and Australia. Eleven communities in Canada's Alberta province have such operations in place. An experiment in Mexico for the delivery of 12 channels over the air to rural villages has just begun. An Alaskan telecommunications consultant is advocating the use of BDC in rural Alaska and has submitted a proposal for a demonstration project. These systems are in their relative infancy and, as such, their history of reliability or appropriateness to rural applications is still sketchy. Some of the advantages of this alternative, as recited by individuals involved in provision of the service[43], are noted below.

- The system is simple to install and maintain, particularly in the over the air distribution mode, which is favored for Alaska. For example, there are no cable drops (home connections) or line amplifiers to fail in a BDC system. The prime area of concern here is the individual home tuners required for signal decoding.

- The BDC system can be controlled from the broadcast uplink. A package of channels can be modified from that location rather than having to go to each earth station as in a network of community cable operations.

- The capacity to handle innovations such as high-definition television and stereo television, which, it is assumed, will require wider bandwidths than standard television signals, and features like community access and interactive services, is inherent in current BDC equipment.

- The cost of such systems appears to be relatively low, particularly on a per channel basis. While a detailed analysis has not been done, the cost of establishing 12 channel, over the air systems at 166 sites should be in the range of $4,670,000 to $12,500,000, which could be provided via grants. The lesser figure excludes the cost of building new earth stations. Anderson Scientific has recommended six meter dishes, however, if testing were to indicate that 4.5 meter dishes afforded adequate reception of satellite signals, costs could be held at bay. If new antennae were necessary at all sites, which is unlikely, additional expense, on the lower figure, would be about $3.9 million.

ADOA has evinced some interest in the system as a result of our research and a DTS staff member has just concluded a Canadian trip which featured a stopover at the Anderson Scientific facility in British Columbia in order to assess the system.[44] Their initial reaction to BDC for Alaskan use has been favorable.

Although the preceding characteristics would seem to be extremely attractive, this system is far from established as an ideal alternative. At this point, staff in DTO and some Alaskan cable service providers feel that the maintenance question is an extremely important one. Their position is that the gains to be realized through cost advantages and multiplicity of channels will be significantly outweighed by the difficulties of maintaining tuners and antennae at individual homes.[45] Another point to consider is that transmitters for these systems are still in the developmental stage and are unproven. They are slated to be available in the near future. At this juncture, it appears as though these objections are based on general expertise and experience in the satellite TV field, rather than knowledge of the specific system, however. A concrete dilemma associated with 12 channel systems is that users are required to choose between two distinct sets of channels because the typical 24 transponder satellite transmits half of its signals "horizontally" polarized and half "vertically." 12 channel systems can utilize only one or the other. Lastly, recurring costs and the ability of communities to assume these costs is speculative at this time. Programming costs would certainly be much higher than those for three channel systems and rough estimates suggest a range of $734,400 to $2,363,300 per annum, depending upon the scheduling selected. Maintenance costs are unclear.

It should be noted that Anderson Scientific has indicated to the Rural Research Agency and to ADOA that they would consider arranging a demonstration project on a donation basis. Another demonstration project has been outlined by Stuart Browne, a Juneau telecommunications consultant. Certainly a field test should be completed prior to accepting the technology for Alaskan use.

One last question is relevant to the feasibility of Block Down Conversion in Alaska. If BDC signals are to be sent over the air, those signals then become a broadcast over which the FCC has jurisdiction. Since no broadcast license category exists which applies to BDC, an experimental license would have to be obtained. There is considerable sentiment that it would not be impossible to secure such a license, but the related proceedings could develop into a significant delaying factor, possibly a year or more. Given the fact that current methods rely on low power local broadcasts, it would seem that licensing could be obtained.

E) Pick A Satellite, Any Satellite

Several of the alternatives we have discussed would necessitate the use of an alternative satellite or satellites. Aurora transponds only two channels, not the variety that could be used by some local plants. If the delivery of State sponsored television is to depend upon an alternative satellite, several issues become important.

- Is there a choice if other satellites are to be utilized as programming sources?

- Are there other satellites which can be uplinked to by Alaskan program sources?

- What are the ramifications of such an action?

The first item depends upon two factors: 1) the availability of appropriate programming on the spacecraft's transponders and 2) the selected delivery method. Substitutes for Aurora must be selected with both considerations firmly in sight. If a satellite is to be selected for direct transmission to all communities receiving ITV or TVP, then it must have a good footprint statewide. Westar IV, for example, is used by the Alaska Public Radio Network to transpond radio broadcasts to some bush communities and as such would appear to have the ability to deliver television signals also. Galaxy I is receivable in at least one western community. In some cases, the relative strength of statewide footprints is not known. Only field tests could provide definitive answers. On the other hand, if programming is to be uplinked from Anchorage, as it is now, satellites like Telstar or Comstar D3 which have both less power and a eastern orbit niche could be employed.

Westar IV and ANIK D have been mentioned as two likely candidates for substitution for Aurora or complementary use with that satellite for other reasons. Westar has six transponders dedicated to the Public Broadcasting System (PBS), which uses only part of that capacity. PBS is actively looking for someone to lease their excess transponder capacity.[46] Westar may have reception problems on small dishes in Western Alaska, however.[47] ANIK D's footprint does cover all of Alaska and it carries U.S. network programming. FCC rules or international treaties may impede delivery of that programming, although ADOA has testified that will not be the case.[48] The other problems we have spotlighted in this chapter may render ANIK a less than likely prospect.

The use of a satellite other than Aurora to uplink Alaskan originated television productions, Learn Alaska's schedule, certainly, and possibly a PTV feed, is eminently possible. If a satellite can be received in Alaska, it can be uplinked to by properly equipped earth stations here, particularly by the favorably situated ones in Anchorage or most other parts of the state, with possible problems for extreme western and northern locations. The only other consideration is the availability of transponder space on the spacecraft in question. As just noted, Westar IV has excess transponder capacity now. As for the satellites now carrying the bulk of the entertainment programming and which are circling the globe in westerly arcs and have a hope of decent reception on a statewide basis, there are several potential choices (see Table I). For example, Galaxy I had eight vacant transponders and Comstar D4 nineteen, as of July, 1984. As a glance at Appendix III will demonstrate, Galaxy I would be the odds on choice for downlink to multiple channel systems since it does have a variety of telecasts on board. If a plethora of programming was not the goal, Comstar might be acceptable. This matter would be moot if more than one satellite were used for delivery. A multiple satellite system, however, would likely cost more than a single satellite setup, certainly for earth stations retrofits. The catch is that Galaxy's transponders may fill up soon, as Satcom F3 reaches the final chorus in its swan song. Quick movement may be required to secure a transponder.

An inquiry into the ramifications of selection of another satellite for programming reasons involves an indepth collection of issues and as such, shall be postponed until the next chapter.

F) Other Options

Under this heading there are two items of some significance for our subject. A short look at each is in order.

1) Both the Learn Alaska Network and the Alaska Public Broadcasting Commission seek the capacity to uplink programming on their own.

    - The Learn Alaska Network is moving towards acquiring the capability to uplink ITV programming. The University of Alaska plans to include a request for such capability in its FY '86 capital budget. LAN now pays $88,000 annually to Alascom in uplink charges. A retrofit of their 10 meter dish in Eagle River to include uplink abilities would cost approximately $150,000. The rest of the equipment required to realize this plan exists in the present LAN microwave links to the Alascom Toll Center in Eagle River and would simply have to be directed at the Learn Alaska dish. Operating costs are not expected to change.[49]

    - The Alaska Public Broadcasting Commission, as part of its scheme to provide programming via satellite to rural Alaska, would like to have several regional uplinks to provide locally originated programming. (See below) APBC engineers estimate it would cost about $150,000 each to upgrade four downlinks to uplink capability.[50]

Both of these proposals are technically possible, but one practical problem may interfere with their ever becoming reality. Alascom would take a dim view of allowing an independent uplink to Aurora.[51] Alascom has not, in the past, allowed such an entree to their satellite (although RCA and other carriers have done so) other than by what they refer to as "established carriers". Alascom's justification is rooted in their determination to keep complete control of their system. They cited the possibility of transmissions wandering off the intended transponder or of excess power damaging amplifiers as dangers inherent in such a loss of control. It is possible that they wish to avoid the loss of revenue also. Although no formal approach to Alascom on this possibility has occurred, the carrier's initial reaction suggests that in order for either the Learn Alaska Network or PTV to uplink, another satellite would have to be the target.

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2) Local origination of programming for local distribution through public access to community television systems is an ability that has been much desired, both by local residents and agency representatives.

   - Some local cable systems already provide this option in the form of community bulletin boards or video production capabilities. Pilot Station, Nome, and Emmonak, for example, have already begun producing local programming.

   - Block Down Conversion systems also offer this capacity, both the community bulletin board and video productions options.

   - A number of local school districts have inquired about the possibility of using the ITV transmitters in their communities to disseminate locally produced programming. This is technically feasible and Learn Alaska is working on guidelines for such productions at the moment.

G) Some Problems

There exist some difficulties and disagreements concerning the delivery of TVP and ITV that bear some illumination at this point. These issues involve both items that have been identified by other sources as needing attention and some matters that we have touched upon ourselves in this writing. They fairly neatly fall into three categories: Ticklish Technicalities, Procedural Pitfalls, and Controversial Complexities. We will briefly review these, noting areas of progress and still smoldering hot spots.

Ticklish Technicalities

1. It has been recommended that the TVP network establish microwave links between its Tape Delay Center and the Anchorage commercial broadcasters which supply programming for RATNET. This improvement would free both entities from the inconvenient process of taping and exchange of programs intended for RATNET. The TDC would then become responsible for program technical quality. Two of those three links are now in operation and the third is soon to follow.[52]

2. The Alaska Public Broadcasting Commission has fielded a large number of complaints that the KYUK translator system operates poorly. They characterize it as a "cumbersome system that gets worse as each translator hop is added."[53] Negotiations are underway now with the Learn Alaska Network concerning the delivery of "Yupik News" via satellite to Yukon-Kuskokwim villages, but this is only a partial solution to this problem.

3. The delivery of ITV programming over the air in communities with cable systems utilizing unshielded cable can result in interference problems for cable operators. A plant upgrade, which naturally will cost money, may be the only way that operators can deal with the problem. ADOA has claimed to be working with individual operators to minimize the problem.

4. An ongoing controversy between ADOA and LAN officials concerns the quality of signals delivered over ITV. The Division of Telecommunications Operations is responsible for operations and maintenance of State owned facilities. Chuck Hickman, LAN's Operations Manager, has claimed that up to 20% of the LPTV's are improperly engineered and need either re-engineering or upgrading.[54] The staff of DTO responds in twofold fashion:[55]

   - DTO has done its best given the circumstances; to wit, a very large and hurried job (establishing a 250 community network), developed in a "shotgun fashion", has had to be handled by a relatively small division (55 employees). They have indicated that, with the funds appropriated, the last five years could easily have been devoted to engineering work, but neither network would be in operation today. Given increased budget and manpower, DTO concurred that some engineering improvements could likely be made, but that it would certainly be much more expensive than the approximate $400,000 now spent annually on maintenance. That budget pretty much restricts DTO to responding to service complaints, a costly enough proposition at remote sites.

   - There is a perceptual difference between LAN and DTO on the issue of signal quality. DTO feels that LAN's standards are not realistic, that a network that delivers a perfect signal to all possible viewers is not practically possible. Broadcast industry standards cannot be met as a result of the magnitude of the project and speed required to complete it. They further claim that the great majority of service complaints forwarded by the Learn Alaska Network turn out to be unfounded or the result of the inherent limitations of the system. It simply must be accepted that there will always be individuals with reception problems, but that, in most cases, such individuals would have the same problem in almost any circumstance. In place low powered television transmitters have a limited range. Reception quality, depending on geographic layout, may be still further limited by the need for line of sight transmission paths. DTO has maintained that they take their responsibility for O & M seriously and have been able to do what is necessary with the resources at their disposal.

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Procedural Pitfalls

1) A number of communities are still awaiting FCC licenses to begin broadcasting. According to ADOA, the FCC has some 50,000 license applications before it, which delays the issuance of licenses by a year or more. The problem of delay is seen as inherent in the FCC process by ADOA.

2) A number of communities are still without TVP and/or ITV service. An even greater number do not have TVP and/or ITV facilities. Some of the latter do receive either or both signals over the air from neighboring communities, via microwave relays, or over cable systems. The exact number and identity of the communities that do receive either network via these means is difficult to ascertain. A number of sources have been examined without clearing up this confusion completely. The following lists of communities without ITV or TVP[56] excludes those communities that have been identified with some certainty as receiving service from one source or another. Also excluded are communities with pending FCC licenses. These lists exclude urban communities, which are considered in the next section. Part of the difficulty in identifying communities is a result of differing definitions of communities

Table IV

Communities without ITV or TVP

Communities w/o ITV (15)
- Tyonek
- Diomede
- North Kenai
- Napakiak
- Fort Greely
- Brevig Mission
- Devils Mountain Lodge
- Tanacross
- Smith Cove
- Portage Bay
- Edna Bay
- Neets Bay
- Big Salt Lake
- Hollis
- Long Island

Communities w/o TVP (11)
- Clark's Point
- Chuathbulak
- Big Lake
- Healy
- Hope
- Nenana
- Eagle
- Sutton
- Tazlina
- Willow
- Circle Hot Springs

worthy of service. ADOE bases its definition of a site in need of ITV facilities on that utilized to determine whether a school should be established: a permanent community with at least twenty-five year-round residents and eight students. ADOA does not seek to define communities as such, but relies upon legislative direction to determine appropriate TVP sites. The disparities in the lists above are the result of these differences, the availability of commercial broadcasts, as well as legislative appropriation and intent combined with executive vetoes and subsequent agency decisions.

3) Building and operating earth stations and attendant facilities in bush communities may be something that is simpler and less costly for the State to do than it is for private enterprise. For example, DTO has been able to persuade local residents to donate the power needed for earth station operations, can cut corners on items such as land title, surveys and environmental impact statements by virtue of their power as a governmental entity. These cost shortcuts may not be available to the private sector.

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Controversial Complexities

1) There is some debate over the precise nature of ADOA's duties as regards the maintenance and engineering of the two networks. Former ADOA Deputy Commissioner for Telecommunications Julianna Guy maintained that her staff understood its duties clearly and at this point they have become routine. They are, basically, the provision of technical support in a cost effective and technically efficient manner, in keeping with the prescriptions of the Legislature. Learn Alaska Network officials, on the other hand, believe that these responsibilities are not clearly defined and have requested that a memorandum of agreement establishing guidelines for all participating agencies be finalized. ADOA has declined to sign several versions of such a document offered by ADOE over the last year or two, saying that it was too complex and would do no more than add another layer of complications. ADOA has agreed that improved relations with the Learn Alaska Network are desirable.[57] In a recent case, hard feelings between the two agencies seem to have been engendered by a misunderstanding by Learn Alaska Network staff concerning the manner in which ADOA proposed to deal with a shortage in funds allocated for maintenance towards the end of the last fiscal year. The former agency had the impression that DTO would respond only to emergencies, when DTO claims it meant only that it would try to aggregate maintenance calls rather than respond to all calls immediately.[58] A more detailed discussion of this issue may be found in the paper on Learn Alaska Network.

2) The possibilities for streamlined or combined management of the State's television networks has been the subject of some thought. In the abstract, Guy believed it possible to combine under one roof many of the administrative and management functions of TVP and ITV. There is some resistance to this idea from LAN. ADOA has identified some particular areas in which cost efficiencies could be attained, such as streamlining of LA's production facilities. The Learn Alaska Network has not agreed with ADOA's position. In another instance, Learn Alaska Network officials' suggestion that the tape delay centers operated by each of the two networks could be easily and thriftily combined with some savings in operating costs has been affirmed, in theory, by DTS.[59] Again, please refer to the paper the Learn Alaska Network for further specifics.

3) Another area of major disagreement between the Department of Administration and the combined forces of the Department of Education and the University of Alaska concerns the delivery of ITV programming to the major population centers of Anchorage, Fairbanks, Juneau, the Mat-Su Borough, and the Kenai Peninsula. Despite the fact that the Legislature has made appropriations for the purpose of providing ITV facilities in those areas, LAN is concerned that much of those areas are still without facilities or that service is not "universal". They believe that the largest school district (Anchorage) in the state should have full ITV schedules available. They also point out that ADOA has chosen not to provide LAN broadcasts in communities with cable systems, instead relying on cable operators to provide the signal to viewers. LAN holds that this situation runs counter to legislative intent to provide ITV without charge to all viewers, since in virtually all cases, at least a minimal charge is made to all customers, including schools.[60]

ADOA replied to these contentions by maintaining that they are providing the best service possible, given the constraints of practicality and budget appropriations.[61] Their intent has been to develop a reasonable balance between engineering and budget considerations and the provision of service to the sites most in need of it and they fully intend to provide service in all areas specified by the Legislature, as it becomes feasible.

- On the Kenai Peninsula, ADOA asserted that most people on the road system can receive ITV via one source or another. Off road coverage may be less comprehensive because of shortages of two vital impetuses: money and electric power. On the Seward side of the Peninsula coverage is less complete generally.

- In the Matanuska-Susitna Valley, the department stated, the LAN is provided to those needing it most, the schools, in the bulk of communities, either via on site earth stations low cost cable hook-ups. (ADOA has, in some instances, provided satellite dishes to cable companies.) For complete coverage, ADOA noted, a full power VHF television station, rather than a profusion of local LPTV's, would be needed to blanket the area. ADOA estimated the cost of such a facility at nearly $1,000,000 They went on to say that the FCC would be unlikely to license such an installation due to its proximity to other stations. Alternatively, UHF transmitters would be unsatisfactory due to their restricted range and the uneven terrain of the Mat-Su Valley.

- In the Fairbanks region, ADOA looks to four local cable firms to begin offering ITV at minimum rates once they have more channels available, hopefully by the beginning of the 1984 school year. Over the air broadcast would, again, require many LPTV's, impossible to establish with the limited appropriation made by the Legislature (in June 1981, legislative intent specifically set aside $300,000 for ITV facilities in Anchorage, Fairbanks, and Juneau), or a VHF station, which has been costed out as follows:[62]

Transmitter	$401,500
Antenna	50,000
Microwave link	26,400
Parallel transmitter	77,000
Site Prep/Tower	165,000
Total	$719,900

  This alternative may be pursued by the LAN for FY 1986.

- In Juneau, the Learn Alaska Network is provided as part of the local cable operation's basic service at the standard price. ADOA has no other plans to expand service.

- As far as Anchorage is concerned, ADOA feels that adequate instructional programming is provided by the local public television station (KAKM) and cable. There are no plans to develop alternative delivery of ITV to the city.

The situation in Anchorage has been the tinder for a long smoldering spark of contention. As we have noted, Learn Alaska officials believe that the largest community in the state should have a complete ITV schedule. The idea of a full power VHF station transmitting an LAN feed has been in the air for some time. ADOA's cost estimate of this course (with corners being cut by using State land, an unmanned facility, etc.) was:

Transmitter	$401,000
Antenna	55,000
Microwave link	66,000
Parallel transmitter	165,000
Site Prep/Tower	275,000
Total	$962,000

This alternative may also be pursued by the LAN for FY 86.

At one time, the FCC was petitioned by DTO for an "allocation of the table of services", which essentially is a request that a channel be made available for use. Only one additional VHF channel has been allocated by the FCC for the Anchorage market. Despite this fact, Anchorage commercial broadcasters, when queried, voiced no objections to the possibility of that one channel being allocated to an instructional station. In fact, they felt that it might prevent an additional commercial channel from eventually competing with them.[63] Commercial broadcasters were of the opinion that the audience share of educational offerings on KAKM has been too low to justify the establishment of a full time channel. That perspective is likely rooted, to a certain extent, in the necessary emphasis that industry places on the "ratings game", which is not quite so important for a network which does not have as its goal attracting the largest possible portion of the mass audience.

Dick Enders, Acting General Manager of KAKM, the city's public television station, noted that KAKM has been providing instructional broadcasts for ten years, many selections originating with the Learn Alaska Network. KAKM plans to devote 19% of its air time in the 1984 school year to ITV for the kindergarten through college levels. He contended that a full power VHF station would be redundant.[64] Marilyn Scott, Director of Communications and Media for the Anchorage School District, has said that a Learn Alaska VHF station would be redundant as far as the needs of the district are concerned. The school district now has two hours daily of instructional programming over KAKM, including LAN, district funded and leased selections. There is also a free cable channel, Cable Classroom, arranged for by the district, which carries the Learn Alaska signal. All cable subscribers receive it and Anchorage schools are being connected now.[65]

Commercial and public broadcasters, ADOA officials, and an Anchorage School District representative all expressed some reservations towards the idea of a Learn Alaska VHF station on the basis of the cost of such a facility. The figure of $962,000 has been mentioned, but commercial broadcasters believe that the cost could be as much as thrice that amount.

4) Long term policy considerations are a bedrock concern of the Department of Administration. The department is in full support of a long term planning effort for the Television Project. ADOA has indicated that they have been unsure of the future of the project and as such has not developed any long range policy for delivery of RATNET. In fact, there has been a reluctance to do so, in the absence of firm legislative guidance. TVP has been growing, like the proverbial snowball, as a result of almost annual legislative action, but despite an existence approaching a decade, the project still lacks

direction. ADOA has expressed reluctance to assume that the project will continue to be sponsored by that body for any appreciable period into the future and desires clear directives in that respect.[66] Additionally, the department has not recognized, in that continued growth, any implication of "a duty to provide entertainment television to all citizens or communities" that do not have access to commercial television. There has been no legislative guidance on that policy issue, in ADOA's view. Nor is Executive Order 50, which, in 1981, reorganized the State's telecommunications agencies and established executive policy, regarded as a sufficiently, explicit set of marching orders. As a result, it has been ADOA's impulse to simply request yearly budget allocations sufficient to maintain the network as established by the Legislature. It is conceivable that this "confusion" is a product of the department's unconcealed opinion that State government should not be in the business of providing entertainment television. Whether such is the case, a statement of the purpose and goals of the TVP does not exist. In this light, ADOA has declared its support for the interim task force on telecommunications scheduled to meet later this year and for which this series of papers has been researched and composed.

Learn Alaska officials have similar questions about the long term purpose and goals of their network. Their policy concerns also include the division of responsibility between themselves and the Department of Administration, as alluded to earlier. Those concerns are considered in more depth in the appropriate paper.

Chapter IV

Summary and Recommendations

PROGRAMMING ISSUES

A) Dual Format Transmission

If the dual mode is implemented, programming as it now exists, LAN and RATNET, would have to be continued. A switch in programming sources would not be possible without altering the dual format arrangement.

* * * Recommendation * * *

> The long term future of LAN and RATNET should be defined prior to a conversion to a dual transmission format.

B) Network Programming Availability

RATNET has obtained its programming from national network affiliates in Anchorage, in exchange for State sponsorship of the uplink of live programming from the continental United States. By early next year, all the affiliates will have the ability to receive live satellite feeds themselves. It is unknown whether this will impact their willingness to provide, without charge, programming to the State.

* * * Recommendation * * *

> The State should pursue a written agreement with Anchorage affiliates for continuation of the present arrangement, if RATNET is to be continued in its present form.

C) Other Programming Sources

There are over fifty satellite channels receivable in Alaska. Satcom F3 is the major source of entertainment programming, but it will likely be replaced by Galaxy I in the near future. More of these channels would be available in a system which first downlinked transmissions to Anchorage and then relayed them out to the bush, because more satellites can be seen from that city. Larger dishes than those now in place in most rural communities would allow the reception of additional satellites there also. The costs of system retrofits will vary accordingly if multiple channel plants are sought.

D) Some Specific Alternatives

Several substitutes for the programming discussed in the preceding paragraphs do exist. These include:

- Local programming produced primarily for local distribution. Such production is already taking place in a number of rural communities with access to local facilities.

* * * Recommendation * * *

> The production of local programming should not be impeded by the State. Any system redesign should embody the technical capacity for public access to community television facilities for such purposes.

- Public television broadcasts from the four Alaskan stations include local productions and alternative programming from PBS. Through regional uplinks, this programming could be a part of any delivery/distribution network, including the present one.

* * * Recommendation * * *

> The inclusion of Alaskan public television broadcasts in any new satellite delivery system should be considered. The present system, if continued, could be revamped to include PTV through such means as 24 hour use of transponders, rescheduling some LAN broadcasts to night hours (for videotaping purposes), etc.

E) What Do The People Want?

Two questions are suggested by the topic of this section.

> What kind of programming do the viewers of ITV and TVP want?
>
> What is the purpose of each of the two networks?

It was not our charge to examine programming content policy. It is difficult to ignore completely, however, since programming choice is closely related to delivery and vice versa. A number of observations, in the absence of hard knowledge, on the needs and desires of the audience of LAN and RATNET should be made.

- A variety of commercial programming is desired and available.

- Locally produced programming is desired and supported by rural residents.

- Public television broadcasts, at least according to the APBC, are a staple that rural viewers would like included in their video diets.

- There is some controversy over the level of ITV's audience share and the actual utility of scheduled, live programs in the classroom as opposed to independent use of videotaped ITV.

- The viewing preferences of ITV and TVP audiences are not clearly defined.

* * * Recommendation * * *

A comprehensive needs assessment and utilization profile of ITV in the home and in the classroom should be undertaken. This effort should address the need for live broadcasts versus broadcasts for taping purposes. A survey of viewing patterns and preferences, in general, for TVP should be undertaken, if that network is to continue unchanged.

Chapter IV

PROGRAMMING ISSUES

Apart from questions of the technical and practical feasibility and long term costs of any format for television delivery and distribution in Alaska, there are issues concerning programming policy, availability and origination that should be considered in any review of the general desirability of proposed modifications of the delivery system. Several options and issues deserve illumination, albeit rather briefly, in this chapter.

A) Dual Format Transmissions

First and foremost, the dual transmission format proposal hinges upon the assumption that the fundamental configuration of the programming provided by the State will remain a constant. If the State maintains ITV and TVP programming as now delivered, the dual format will be feasible. However, an alteration in programming could render a dual format conversion premature or inadvisable. If support for ITV or TVP were terminated following conversion to a dual format, the result would be that the State could be left with excess delivery capacity, i.e. half a satellite transponder and one earth station and LPTV per site. Of course, under the current system, if ITV or TVP were cancelled, one earth station and LPTV would be redundant, but those could be used to deliver another full bandwidth programming source. Equipment designed for dual operation can handle only half bandwidth programming. Other programming currently available for Alaskan downlink is full bandwidth, which could not be transmitted or received on half bandwidth modified transponders and receivers.

As this implies, should the Legislature, after approving conversion to dual format, decide to terminate one or the other of its current television projects with the notion of replacing the cancelled programming with programming from another source, in particular another satellite, that option would be precluded. Dual format will preclude going to programming sources other than ITV and TVP, as presently configured.

B) Network Programming Availability

The Rural Alaska Television Network, which establishes programming policy for the TVP, obtains programming material from the three Anchorage national network (CBS, NBC, and ABC) affiliates. In exchange for the right to rebroadcast, via RATNET, copyrighted network programs to the bush, the State has footed the $500,000 annual bill for satellite transponder time to bring real time network television to Alaska. By early 1985, each affiliate will have their own earth station. The implications of this change for RATNET programming are unclear. Informed sources from different positions suggest different scenarios.

- Julianna Guy suggested that although Anchorage broadcasters could withhold program rights, they would be unlikely to do so. She stated that they would be more likely to use program rights as a bargaining chip, for example, to prod the State to extend commercial broadcast service to other regions, as it does now to Kenai, Eagle River and Girdwood, via microwave facilities. She noted that should program rights be withheld, the State has already begun to pursue alternative program sources (ANIK, for example). Other ADOA officials believe advantages to broadcasters of statewide exposure are so great that no changes will occur.

- Charles Hickman was of the opinion that commercial broadcasters may well be tempted to withhold rights, depending upon the state of their relations with ADOA.[67] He claimed that the State has the best part of the deal now.

- Marv Weatherly, a Commissioner on the Alaska Public Utilities Commission, concurred with Hickman and cautioned that an agreement with local affiliates to retain rebroadcast rights should be pursued. (No such agreement is in force at present). Weatherly felt that the networks might demand compensation for program rights and could overrule local affiliates wishing to maintain the current arrangement. Weatherly noted that alternative satellite sources, ANIK in particular, might be difficult to obtain as a result of network and affiliate objections to such an arrangement, combined with FCC rules and international communications treaties.[68] However, Guy stated that ADOA had received assurances from its attorneys in Washington, D.C., that the rights to ANIK transmissions were obtainable.[69] The questions surrounding international treaties and FCC questions are all matters of law, parts of which are potentially threatened which change as a result of lawsuits, but ADOA regards these questions as likely to be settled in favor of the State being able to utilize ANIK D as a program source. That opinion may have changed now, in light of the recent discovery by ADOA that CanCom pays no fee for the feed nor are they authorized to transpond the American signals in question.

- Augie Hiebert, Chairman of the Board of Northern Television in Anchorage and a spokesman for local broadcasters, expressed the opinion that local affiliates would most likely preserve the current arrangement providing the State the right to rebroadcast network programming. Barring unforeseen circumstances or difficulties, he said that local affiliates should have no trouble reaching an agreement with the State and that the networks were in the habit of heeding the wishes of local broadcasters.[70]

C) Other Programming Sources

No matter the outcome of the debate over the availability of commercial programming for use by RATNET, a reconfiguration of the system of delivery for State sponsored television carries with it the strong potentiality that alternative programming will have to be secured. A number of options have already been discussed in the chapter examining possible systems reconfigurations. Rather than repeat that analysis, this section will concentrate on related concerns and will also detail one or two alternative founts of programming.

There are channels galore available for the viewing pleasure of Alaskans. A number of satellites can be received satisfactorily in Alaska and more than 50 channels could conceivably be utilized by RATNET (see Appendix III), running the full gamut from entertainment to information and public service offerings. Many of these channels are already carried on commercial and community cable operations. Most are transponded over a few satellites; SatCom F3 & F4, Westar 4 & 5, and Galaxy I. Still other satellites can be picked up depending on the strength of transmissions and the size and look angle of antenna at the down link site. At this time, Satcom F3 carries what is generally regarded as the best variety of programming. However, Satcom F3's signal is rapidly degrading as the satellite approaches the end of its useful life. A few channels have already switched to the Galaxy I satellite and industry sources state that others are just waiting until F3's transponders are decayed to the edge of acceptable quality of transmissions to make the switch. United Utilities reports that its earth station in St. Mary's (with a 5 meter dish) has excellent reception of Galaxy I's transponders.[71] As far as actual programming on these other spacecraft goes, only ANIK D which carries NBC, ABC, CBS, and PBS affiliates out of Detroit and perhaps Comstar D4 and Telstar 301 with four channels each would seem to be of interest to Alaskan audiences.

A variety of programming exists for potential use should the current delivery system be reconstituted. Just what sources could be utilized depends on several aspects of a redesigned delivery system. The list below details possible changes in delivery mode that will impact programming choices:

1. Programming uplinked from Anchorage following downlink from a new source;

2. Programming directly downlinked from a different satellite to

community earth stations;

3. Larger, more sensitive antenna employed at community earth stations;

4. Multiple channel systems of some nature installed at local sites;

5. The resolution of questions regarding rebroadcast or retransmission rights, copyrights, international communications treaties, and FCC ruling on satellite spacing and service.

Depending upon the mixture of the resolutions to these five issues, either more or less programming will be available. The fourth case would, of course, be a precondition to increased variety. Given that, a somewhat more varied schedule could result in the first case, or in a combination of the second and third. A positive resolution of the last group of matters would allow some new sources to become available. We have discussed all of these issues in greater depth elsewhere, but in this section they have been grouped in order to emphasize that they are all important to a single end result.

D) Some Specific Alternatives

Some alternative programming origins that might replace or supplement national commercial sources are further amplified in this section.

1) Of primary importance in Alaska, given its remove from the national cultural mainstream in general and the strength of its native cultures prevalent in rural areas, is the ability to provide locally originated programming (at least two of the relatively simple local systems we have examined have the capability to allow public access quite routinely). To some degree, programming of local and regional interest is produced now, primarily under the auspices of public television and the Learn Alaska Network. It is one of the goals of the Alaska Public Broadcasting Commission that at least five hours per week of programming on public television be locally produced.[72] Learn Alaska officials are in the process of formulating a policy on the use of local ITV facilities and equipment for production by local school districts. ADOA's Division of Telecommunications Services has the statutory authority to make grants to educational and public users (AS 44.21.230), based on the availability of funds. Additionally, a very few communities with public access to local television systems produce such fare. Despite the multitude of channels to be found on commercial satellites there is no possibility for local control or production of programming. The ability to do

so should be a prime consideration when network design is debated. The question is whether transponder time on another satellite suitable for Alaskan use could be obtained if only one satellite were to be part of the delivery system.

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2) Another source of programming, available instate, which offer both Alaskan, local, and national programming, is the four public television stations. The Northrip proposal to uplink one or more of Alaska's PTV stations could be done in a number of delivery formats, including the present one or the dual format mode. While the particular schedule of the Anchorage, Fairbanks, Bethel, or Juneau stations probably would not have statewide appeal, on a regional basis, with a dose of local programming thrown in, they might well be acceptable. As for fitting them into the delivery system, several options seem possible. Some of the possibilities are:

   - In the current system, Learn Alaska programming could be rescheduled to rely more heavily upon nighttime transmission for taping purposes and otherwise restricted to school hour showing, with evenings and weekends reserved primarily for PTV fare.

   - In a dual format situation, basically the same sort of arrangement could be made.

   - Under the proposal for four channels via two dual transmission transponders, the allocation of the airwaves could be made under the following sort of scheme; one channel for TVP, one for ITV, and one for PTV. The fourth channel could be dedicated to live programming from a variety of sources, both local and national, or for a second entertainment channel. It could be used to avoid the blackouts now common to TVP in the bush or for the regional feeds mentioned in the previous section. The possibilities are legion.

   - In a system which establishes multi-channel systems in TVP communities, PTV could simply be one of those channels.

   - The ITV and TVP transponders could be used 24 hours a day; a third channel could then be carried, for example, if ITV were transponded primarily at night, then PTV could share air time during the day and prime time.

The above options obviously present some interesting policy questions, aside from those concerning the viability of different delivery systems. An attempt to address those questions is the core of the next section.

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E) What Do The People Want?

What the people served by RATNET and LAN want to see on their television screens is a question of the first magnitude. It has roots in two perhaps distinct patches of ground.

- Most important, in one sense, are the preferences and needs of the viewing public in general. They are important if the object of the two networks is to serve the greatest number of viewers possible. A significant portion of the state's rural population has ITV and TVP as its only sources of television.

- From another perspective, the purpose of the two networks must have a significant impact on the programming offered. Certainly an instructional network must not be presumed to fulfill the needs and desires of all of the people, all of the time. As we have already seen, the purposes of the two networks has not been entirely clear to the agencies charged with their operation.

It is not the purpose of this paper to examine closely policy issues such as these, our charge being to scrutinize the possibilities for system design and program delivery, rather than programming itself. It is difficult, however, to entirely skirt the issue of what finally appears on the screens of the viewing populace. In some cases, programming choices can be closely bound up with decisions on the technology of delivery.

Soon, the number of rural communities which will have cable systems offering a broader program selection than may be found on the two State sponsored networks will be in the neighborhood of seventy. According to Deputy Commissioner Guy, people resident in communities relying solely upon TVP and ITV are aware of the variety found elsewhere and are beginning to desire such choice themselves.[73] The question then is what sort of programming is desired? That is best and most simply answered by each community. The ability to select programming is one of the prime attractions of an independent community television operation. A few observations on this subject should be made.

1) The number of commercial channels available via satellite is sufficient to fill the number of channels available on a basic local system (generally up to twelve).

2) Local or regional programming is one of the varieties demanded by rural residents. It could be the aviation weather program offered by the Learn Alaska Network, regional news programming produced by a public television station, an Inupiaq newscast, the soap opera being produced by Nome residents, or coverage of a village potlatch.

3) The APBC asserts that there is a strong desire for distribution of public television programming. They cite the protests of several Southeast communities in 1980 when PTV being microwaved to them was replaced with TVP broadcasts, the inquiries of local officials and residents concerning the possibility of acquiring PTV broadcasts, and the number of complaints on poor service from rural communities.[74] Appendix V lists one year's PTV service requests and complaints as compiled by the APBC.

4) There appears to be no strong fix on what the viewers served by the Television Project and Instructional Television want to watch and actually do watch. A survey of K-12 teachers during the first year of LAN broadcasts indicated only about 20% were using the network in classrooms.[75] There could have been a very real relationship between the newness of the network, though, and the low level of use discovered. There has been no indepth follow-up on that finding since the network's operations have expanded towards their intended level. An internal ADOE document (undated and unattributed) does claim that a random survey late in 1983 revealed that 58% of the school districts in the state recorded ITV broadcasts for classroom use and that 76% of schools used the Learn Alaska Network for instructional support. These figures appear to be an improvement over the initial use level, but they actually tell us little of import.

   Late last year and early this year, a survey on viewer preferences on the two networks was distributed in a Learn Alaska Network program guide. While not a scientifically controlled effort, the results developed some interesting tidbits of information. News and movies appeared to be the best liked programming on RATNET and Alaskan and PTV programming appeared to be the choices on LAN.[76]

5) There is a strong undercurrent of feeling among some observers conversant with the situation that LAN is watched only by a very small minority of potential viewers. Individuals of this conviction included an APBC official, a commercial broadcaster, a rural education consultant, and a telecommunications consultant. Two factors were cited as the basis of these opinions. First, the "lockstep" scheduling of daytime instructional programs does not fit into the teaching patterns of individual instructors. That sentiment has been confirmed by Marilyn Scott of the Anchorage School District who has said that it is not possible to structure the needs of numerous classes around a regularly scheduled television program since the needs and progress of different classes are different.[77] A second unattributed, undated ADOE document seconded that emotion. "Given the individual schedules of each school and teacher, teachers increasingly use their video tape recorders to tape Learn Alaska programming as it is broadcast, and then use it within their classroom day." Secondly, instructional programming is not what people want to see during prime time.

This presumption seems borne out by the results of the informal survey referred to in the previous item. While this "body of opinion" certainly is far from a concrete indicator of actual viewing patterns and desires, in concert with the two surveys that have been taken, there does exist a reasonable suggestion that these patterns ought to be delved into more deeply. That would require two efforts of a complementary nature:

- A comprehensive needs assessment of the audience of the ITV network;
- A carefully designed survey of actual viewing patterns and preferences.

Chapter V

Summary and Recommendations

THE COSTS OF ALTERNATIVE SYSTEMS

This chapter examines, in finer detail, the cost estimates associated with various systems we have considered over the preceding three chapters. The bulk of this information may be more rightfully sequestered in an appendix, however, some new items are discussed herein and thus we have not relegated this section to the appendices.

Rather than summarize the full range of information on costs found in this chapter, that having been accomplished in the second chapter, this recap will focus on the new items to be found in the following pages.

The system alternatives for which pricetags have been calculated are:

1) The current system
2) A dual transmission system (one and two transponders)
3) Delivery of a "super station" via several means
4) A three channel community cable system
5) A community multipoint distribution system
6) Delivery of Canadian satellite transponded programming
7) A direct broadcast satellite system
8) A twelve channel community block down conversion system

Price Notes

- The costs of operating the Television Project will decrease $200,000 in FY 85 and another $735,000 in FY 86 as a direct result of Anchorage network affiliates obtaining their own satellite earth stations. That will leave project cost at approximately $2.9 million annually.

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- Termination liability refers to the financial obligation of the State in regard to facilities for the delivery of TVP and ITV constructed by Alascom specifically for that purpose. Alascom would seek compensation equal to part of the cost of those installations should the State discontinue their use. ITV costs would be $1.5 million and TVP dues from one to two million dollars. The latter cost may be avoidable, according to ADOA.

* * * Recommendation * * *

> Prior to any system retrofit or reconfiguration, ADOA should obtain clear legal opinion on the validity of termination liability claims by Alascom for TVP facilities.

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- Two elements of the calculation of recurring financial burdens associated with several substitutes for the current system made in the Division of Telecommunications Services' report, Satellite Television Alternatives Study, may not hold up under closer scrutiny.

- - Separate estimates were made for system maintenance costs based on State and private sector responsibility. These costs were judged to be substantially higher for private upkeep. ADOA's judgement (an annual pricetag based on 8 % of initial capital costs) relied on service contract prices and informal conversations with cable operators. There are reasons to believe that these estimates may be overstated. For one, the cost of a service contract is difficult for a small community to bear and apparently few have opted to carry them. In addition, anecdotal examples indicate that many villages have had few, if any, maintenance problem. The use of reliable equipment and proper installation of the same seems to have been the key in those cases.

- - The division's selection of factors of inflation and rural population growth to extrapolate long term expense for various systems may be in need of further thought. Their figure for rural population growth is nearly 5 % annually, based upon 1980-1982 data. Long term growth in the bush has been much less than that, ranging between 1.5 % and 2.5 % from 1970 to 1982. The prediction that inflation will remain constant at a relatively moderate 4 % rate for the next ten years would seem to be a little bit optimistic in view of recent American experience.

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- There are two disparate estimates of the costs of developing community Block Down Conversion systems made in this chapter, based on information provided by two sources. This being a new technology, which is on the verge of mushrooming growth, costs are likely to be volatile in the near future.

* * * Recommendation * * *

The costs of Block Down Conversion systems should be more carefully examined as information becomes available on the reliability of systems and equipment.

Chapter V

THE COSTS OF ATERNATIVE SYSTEMS

A closer consideration of the costs of the various systems discussed in the preceding chapters is made in this chapter. While much of the information might seem of the nature that should be relegated to a appendix, there is also much new data herein and, in consequence, we have chosen not to sequester this chapter among the other appendices.

A) Current System Costs

FY 85 operating costs for the present TVP system are found below. These naturally focus on the funding required for the delivery of recreational television and do not include costs associated with the Learn Alaska project. (The Epic Engineering study stated that most equipment and costs could be shared by TVP and ITV; it estimated the total figure, if all Learn Alaska costs were included, at $7,200,000 in annual costs.)

Transponder	$880,000
Dedicated uplink	180,000
Urban downlink	615,788
RCA Conus uplink	60,000
Alascom downlink	1,322,200
Rural distribution	230,000
Occasional use transponders	60,000
State facilities maintenance	290,000
Total	$3,637,988

Costs in FY '85 were originally anticipated to be $2,902,000. ADOA had assumed that some charges would not be incurred, including the RCA Conus uplink, the urban downlink, and the occasional use transponder charges. This was founded on the belief that urban broadcasters would have the ability to directly pick up network programming, thus no longer needing State-sponsored downlink services. ADOA approached Anchorage broadcasters early in 1984, requesting that they share costs for this service during FY '85. The broadcasters responded that since, by early 1985, network satellite feeds would be available directly to all affiliates, the cost sharing question was "moot".[78] The net result, since all Alascom tariffs will remain the same during FY '85 and the only reduction will be for occasional use transponder time, for which ADOA has requested $60,000[79] (reduced from 260,000) will be a budget of $3,637,988. The other charges in question should be eliminated by FY '86.

* * * * * * * * * * *

A Note On Termination Liability

In virtually all alternatives to the current delivery system, except those in which Alascom facilities constructed for TVP or ITV delivery continue to be used, the State and Alascom will have to settle on termination liability charges. These charges are related to Alascom's expense incurred in establishing earth stations called for by the two networks and do not include the costs of equipment located at the uplink sites and the bush earth stations, which are, essentially, usable by Alascom in other capacities. If the State should opt for an alternative which does not require the use of installations now part of the current system, the State will be obligated to pay some or all of these costs. There is some disagreement between the two parties on the amount payable. ADOA maintains that TVP facilities are not subject to these charges since the original agreements and tariffs did not mention the subject. ITV sites would be liable for the damages, according to all parties.

TVP liability	$1,000,000 - $2,000,000
ITV liability	$1,500,000

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B) Dual Transmission Costs

The following is an outline of the estimated costs associated with changing from a single transmission format to a dual transmission format. The Alascom cost estimate details the different cost components upon which the State estimate was based.

1) Dual Transmission over a single transponder:

Retrofit 164 Alascom downlinks[80]		
Modify 4 video uplinks	$ 17,055	
Modify 352 video receivers and replace 8 receivers	712,500	
Retrofit low noise amplifiers at 14 sites	65,960	
Replace Atka earth station antenna	224,485	
Revenue requirements	235,061	
Subtotal		$1,255,061
Retrofit 75 State downlinks	650,000	
Total		$1,905,100

2) The proposal to retrofit the delivery system to one delivering four channels via two transponders each in a dual transmission would cost approximately as follows:[81]

Costs for original proposal		$1,905,000
Alascom Retrofit		
(164 Earth Stations)		
Modify four uplinks	17,055	
Add two each receivers	1,640,000	
Revenue requirements	235,061	
Subtotal		1,892,116
State Retrofit		
(84 sites)		
antenna receivers, LPTV's	1,680,000	
(164 sites)		
LPTV's	1,640,000	
Travel, etc.	460,000	
Subtotal		3,780,000
Total		$7,577,116

The difference in costs is due to uncertainty concerning the technical requirements for retrofits to LPTV's and antennas in individual villages. In a number of communities, notably in the Fairbanks and Bethel areas where there exist relatively extensive translator systems, it would likely be necessary to install more expensive LPTV's and antennas as a result of congestion of the bandwidths utilized for television broadcast. Transmitters with more power (100 watts rather than the standard 10 watts) or with UHF broadcast frequencies may be required in these communities. Such costs would, in the worst case, double the costs of antennae, receivers, and LPTV's, raising the total price tag for conversion to $10,900,000. The State would not see any increase in costs paid to Alascom, but would likely see some increased maintenance costs, possibly doubling the $200,000 to $400,000 spent now and in operating expenses in the provision of an additional two networks.

C) ADOA Options and Recommendations

The Department of Administration has researched other means to provide television service to the bush. These alternatives are outlined below with costs estimates provided by the department. Additional detail is available in the ADOA report of April, 1984.[82]

1) Retransmission of WTBS-TV from Atlanta over the existing TVP distribution system.

FY '85 estimated operating cost*	$ 2,707,876
FY '85 - FY '94 operating costs	32,640,783

This option is estimated to save approximately $930,000 over FY '85 TVP costs. It would, however, deliver only one channel.

* Includes program charges.

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2) Direct transmission of WTBS-TV to bush communities, by-passing the TVP system. This would require constructing television receive only earth stations. Again only one channel would be broadcast.

FY '85 estimated capital cost	$6,390,000
FY '85 annual operating costs	325,676
FY '85 - FY '94 operating costs	3,511,079

Another over the air channel could be broadcast by adding a second video receiver and low-power television transmitter to each earth station.

FY '85 capital costs	$ 3,195,000
FY '85 operating costs	1,536,364
FY '85 - FY '94 operating costs	22,772,080

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3) Providing a 3-channel cable system for 166 bush communities presently receiving commercial broadcasts via TVP only.

FY '85 estimated one time capital cost	$16,243,500
FY '85 annual program costs	514,004
FY '85 - FY '94 program costs	7,849,328

Other costs are predicted to vary depending on whether the State or the private sector operated the community systems. Assuming systems were warranteed for one year, alternative costs were adjudged to be:

State maintenance, FY '86 ' FY '94	$ 7,471,463
Private sector maintenance, FY '86 - FY '94	14,302,216

* * * * * * * * * * * * *

There is a substantial difference between the deduced costs of the last component, based on whether one assumes State or private sector maintenance of community cable operations.

ADOA's judgement of the costs was, for State maintenance, based on their own experience in the maintenance of TVP and ITV facilities, coupled with conversations with the cable industry. Those talks also led ADOA to estimate that private sector annual maintenance contract costs would run at eight percent of initial capital costs. Our own discussions with several firms have uncovered some conflict on this point. While several have indicated that 8% was a reasonable figure for a contract, none were able to confirm it or to document an alternative.[83] One consultant did note that he had not sold a maintenance contract to any community because of the expense and also cited examples of communities in which maintenance had been considerably less than the ADOA estimate, including Pilot Station, where maintenance costs for one year were $1,000 and Manokotak which had required only one maintenance trip in three years. Another operator said that a minor repair, if it required flying in a technician from an urban headquarters, could run to a couple thousand dollars.[84] Costs are likely to increase as time exposes a system to increased wear, but it is possible that, assuming reliable equipment is purchased and properly installed, the eight percent estimate may be somewhat inflated.

* * * * * * * * * * *

ADOA's estimate of the cost of constructing cable systems has been generally confirmed by individuals in the business in Alaska. In a separate note, the provision of interactive capabilities could be a feature of community systems for little additional cost. For a small system (up to two miles of cable), the cost could be as little as $2,000 in equipment (reverse kit, line extenders, and a submodulator). Additional cost would be incurred depending upon the nature of interactive features desired by the community.

The ability of a community to support a cable system without outside assistance is the source of some disagreement. Private sector "rule of thumb" figures for the number of subscribers needed to provide sufficient revenue, including a profit, varied from 70 or 80 to 1,000.[85] Absent the profit motive, one consultant figured that a community with 50 "drops" could charge $50 per month and make sufficient money to pay for programming and maintenance easily.[86] United Utilities cable systems charge subscribers $42. A number of small communities now have cable systems operating under a variety of approaches, some being private companies charging full rates and others community owned non-profit organizations charging for costs only. All the individuals polled predicted that the size of community that could support a cable operation would continue to decrease as time passed.

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4) Providing direct transmission of WTBS-TV initially (FY '85),

followed by cable at a future date (FY '87). In FY '85, 213 earth stations would be constructed in order to receive WTBS and in FY '87, 166 local cable systems would be added. Programming and maintenance costs would be similar to those cited in the previous option.

FY '85 capital costs	$ 6,390,000
FY '87 capital costs	15,773,514
Total costs	$22,163,514

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5) Providing Multipoint Distribution Systems (MDS) transmitting special frequencies over the air to homes equipped with converters that transform these broadcast signals to standard television channels.

FY '85 one time capital cost	$31,257,600
FY '85 annual program charges	1,426,572
FY '85 - FY '94 program charges	21,804,964

Once again ADOA estimated differing costs for maintaining such systems, which would be warranteed for one year.

State FY '85 - FY '94 maintenance costs	$ 8,466,247
Private sector FY '85 - FY '94 maintenance costs	27,794,911

* * * * * * * * * * * *

In our opinion the cost estimates outlined above are reliable generally, but there are two elements that suggest that the long range (FY '86 - FY '94) recurring costs developed by ADOA could be off the mark. ADOA's projections are based on two factors; changes in inflation and in rural population growth. Deputy Commissioner Guy indicated that the 4% annual inflation figure was based on the judgement that current trends would continue into the future. It is difficult to take specific issue with that prognostication, except to note that it would mean about twelve years of sustained moderate inflationary pressures, which case is surely optimistic in the extreme in light of the general trends in the United States since World War II. We might reasonably expect that costs will be somewhat higher.

It is somewhat easier to be critical of the 4.9% annual rural population growth prediction. Alaska Department of Labor statistics based on the U.S. census show that, between 1980 and

1982, the population of rural census districts has grown by that amount and ADOA expects that trend to continue. That seems to us far too short a period from which to extrapolate a long range judgement. It allows abnormal factors such as State capital spending or resource development to influence long term natural increase and migration data. Department of Labor statistics for 1970 to 1982, indicate that annual growth in the remote areas of the state, excluding the road system communities and Southeast, has been in the range of 1.5% to 2.5%.[87] This is one third to one half of the figure tagged by ADOA. This would certainly have an impact on their estimates of recurring costs, decreasing them considerably over time. An example of that impact, based on 2.0% population growth as an average, is found in a recalculation of the programming costs of a 3 channel cable system. ADOA tabulated 10 year costs at $7,849,000, but a two percent growth scenario would yield a cost of $6,785,000 or 13.5% less. ADOA did not figure population growth figures into maintenance costs and it would seem that this may be an error of judgement also. In any case, recurring costs may be somewhat less than those postulated in the preceding options. The likely underestimation of inflation may cause these two factors to balance out somewhat.

* * * * * * * * * * *

6) ANIK - ADOA has also examined the possibility of providing American commercial network programming to the bush via the transponders of the Canadian ANIK D Satellite.

Option 1: retransmission of one channel of network programming from ANIK (selected by RATNET) via TVP Tape Delay Center.

FY '85 capital costs	$ 131,600

Option 2: direct transmission of one network to rural communities.

FY '85 capital costs	$6,517,800
FY '85 operating costs	302,884

Option 3: direct transmission and cable distribution of three channels.

FY '85 capital costs	$16,243,500
FY '85 program service	199,200

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D) Other Possibilities

1) Direct Broadcast Satellites (DBS) beaming signals directly to individual households with their own dishes are not believed to

be a viable alternative for rural Alaska because of high cost of such systems and the scattered locations of such communities. Although costs for individual earth stations are likely to decrease to about $1,000 in the near future, it is unlikely that service will be extended to rural regions. Costs to individual subscribers are unknown at this time.

Cost per household	$3,000 - 6,000
Number of households	10,200
Total cost	$30,600,000 - $61,200,000

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2) Block Down Conversion Systems (BDC) systems are a relatively new application of technology that apparently is on the brink of mushrooming growth as new systems become available. (One dealer stated that a number of new systems should be unveiled as soon as this fall.) With that prognostication in mind, we will present some estimates of the costs of replacing the current TVP delivery system with BDC systems in the communities without other commercial television. ITV could be carried over this system. Going to such a system would involve at least two expenses in addition to the establishment of community systems:

   - It would trigger the termination liability charges referred to earlier in this chapter. The total charge would be from $1,500,000 to $3,500,000, the former if charges were due only for ITV sites and up to the latter for TVP sites also.

   - It would require that an uplink facility for ITV be put into operation, if that network was to be included in the programming delivered over the system. That cost has been identified as $150,000. Other uplinks would be needed for other noncommercially produced programming.

Systems employing Anderson Scientific equipment are in operation in a number of communities in the U.S., Canada and other nations. Figures supplied by their office in British Columbia were used to develop the following cost projections.[88] They represent costs for 12 channel over the air systems and which assume that the satellite dishes now in use will provide acceptable reception for use in these local plants. We have made additional calculations ourselves on the costs of installing a six meter dish at each community for two reasons; first, 4.5 meter dishes may not provide suitable reception in some places; second, more than one dish may be desired in order to receive more than one satellite for increased programming choice. Due to the developing nature of this technology and a resultant lack of a large body of cost data, these estimates are relatively educated guesses at this point.

Transmitters	581,000
Antennae	25,700
Downconverters	16,600
Labor	664,000

Home receivers	1,938,000
Antennae	255,000
Labor	408,000
Freight *	880,000
Total Cost	4,668,300

TVRO antennae #	$1,328,000
Labor *	1,660,000
Freight *	880,000
Total Cost with TVRO's	$9,416,300

* These costs were taken from ADOA's 4/19/84 report and our own estimates based on interviews with various sources. Russ Walsh of Anderson Scientific (Canada) stated that BDC system head ends were essentially identical to cable head end equipment and we, therefore, based our extrapolation of the freight and installation costs of the Anderson equipment on the average costs for cable operations.

# Television receive only satellite dishes.

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2) Figures supplied by a Juneau telecommunications consultant have allowed us to make an alternative estimate of the costs of a BDC recapitalization.[89] These figures were for a single community system with 100 users, but if we accept that as an average community, a somewhat imprecise estimate of the costs of a program to replace the current TVP setup can be developed.

Head end equipment	$20,000
Outside plant	40,500
Labor	10,000
Freight	4,500
Subtotal (per community)	$75,000
Number of communities	166
Total	$12,450,000

These two estimates are based on costs that are rapidly changing as the technology develops. The difference in estimates emphasizes the existence of this rapid metamorphasis. As new equipment becomes available (and we do not mean to imply that Anderson Scientific equipment is the only BDC equipment on the market now), opportunities to realize savings may develop. Certainly the cost of providing numerous over the air 12 channel BDC systems in the bush will have to be more closely scrutinized before a true picture of their desirability can be formed. Maintenance costs of such systems are still something of an X factor at present, although systems are warranteed for one year. Interviews with several retail operations handling the equipment tended to confirm the company's claim that home receivers were reliable, although none could offer specific figures.[90] Head end equipment was described as being at least as reliable as standard cable electronics.

Program costs would depend on the programming chosen for the system or community. With 12 or 24 channels, these costs would be somewhat more substantial than the annual costs identified by ADOA for three channel cable systems. Subscription costs range from 10¢ per subscriber per month for WTBS to about $5.00 or $6.00 for premium movie channels. Costs are often negotiated individually by operators. A statewide buying club might be created to seek a volume discount to combat excessive costs. Cost estimates for an economy line of 12 channel programming, which includes a little bit of everything, including several free channels, range from $734,000 to $857,000 per year. A premium schedule, with several movie channels might run as much as $1,995,000 to 2,363,000 annually. These costs translate into monthly subscriber costs of from $6.00 to $7.00 and from $16.30 to $19.30, for programming only.

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Appendix I

Cable Systems in Alaska

Community Owned

- Akiak
- Alakanuk
- Ambler
- Anaktuvuk Pass
- Angoon
- Atkasuk
- Barter Island*
- Buckland
- Chevak*
- Craig
- Dillingham
- Emmonak
- Ft. Yukon
- Hoonah
- Hydaburg
- Igiugig
- Kake
- Kaktovik
- Kiana
- Klawock
- Kotlik
- Manokotak
- Marshall
- Metlakatla
- Mountain Village
- Nuiqsut
- Nunapitchuk*
- Pelican
- Pilot Station
- Pitkas Point
- Point Hope
- Point Lay
- Prudhoe Bay
- St. Michael
- Sheldons Point
- Shungnak
- Stebbins
- Thorne Bay
- Unalakleet*
- Wainwright

Commercially Owned

United Utilities
- Gambell*
- Hooper Bay
- Savoonga
- Quinhagak*
- St. Mary's
- Togiak
- Kipnuk*
- Toksook Bay*
- Tununak*

Multivisions
- Anchorage
- Eagle River
- Elmendorf AFB
- Ft Richardson
- Kenai
- Soldotna

Alaska Cable Network
- Ft. Wainwright
- Eielson AFB
- Ft. Greeley

Alaska Cablevision
- Cordova
- Valdez
- Wrangell
- Kodiak
- Kotzebue
- Nome
- Petersburg

Interior Telco
- Galena
- Unalaska

McCaw Cablevision
- Juneau
- Ketchikan
- Sitka
- North Pole
- Fairbanks

Matanuska Telco
- Wasilla
- Palmer

ED&D
- Haines
- Skagway

Spectrum#
- Anderson
- Delta
- Fairbanks
- North Pole

Bethel Cable
- Bethel
- Platinum

Unknown
- Levelock*
- Scammon Bay*
- Aleknagik*

Independent
- Yakutat*
- Port Lions
- Barrow

Information on community systems is still being gathered and is not definitive in all cases.

* In the planning or construction stages or operational status unknown
# Over the air subscription service

Source: Division of Telecommunications Services, August 21, 1984.

Appendix II

Communities Without Commercial Television
By 1982 Population

0 - 100

Baranof Hot Springs #
Beaver
Bettles
Birch Creek
Cantwell
Cape Pole
Central
Chalkytsik
Chignik Lagoon
Chistochina
Chitina
Circle
Circle Hot Springs
Clark's Point
Corner Bay #
Council #
Eagle Village
Egegik
Ekuk #
Ekwok
Elfin Cove
False Pass
Freshwater Bay
Funter Bay #
Gustavus
Happy Harbor #
Halibut Cove
Hobart Bay #
Hughes
Huslia #
Iliamna
Ivanoff Bay
Karluk
Kasaan
Kobuk
Kokhanek
Koyukuk
Levelock
Lime Village
Manley Hot Springs *
Mentasta Lake
Port Heiden
Medfra #
Meyer's Chuck
Minchumina #
Moose Pass
Nelson Lagoon
Nikolaevsk
Nikolski
Oscarville *
Pedro Bay
Pilot Point
Point Baker
Port Alexander
Port Alsworth
Portage Creek
Rampart
Red Devil
Rowan Bay
Skwentna
Slana
Sparrevohn
Stevens Village
Stoney River
Takotna
Tatitlek
Telida
Tin City #
Tolsona #
Twin Hills
Windfall Harbor #
Woman's Bay #
Woody Island #

101 - 200

Akhiok
Akutan
Allakaket
Annette
Arctic Village
Anvik *
Brevig Mission
Chignik Bay
Chignik Lake
Chuathbulak
Coffman Cove
Cooper Landing
Crooked Creek
Deering
Diomede
Eagle
English Bay
Golovin
Goodnews Bay *
Kalskag *
Kenny Lake
Klukwan
Koliganek
Koyuk
Larsen Bay
Mekoryuk
Minto *
Naukati Bay
Newhalen
Newtok *
Nightmute *
Nikolai
Nondalton
Northway
Pelican
Perryville
Port Alice
Port Graham
Russian Mission *
St. George
Shageluk *
Shatoolik
Sleetmute
South Naknek
Tenakee
Tetlin
Venetie
Wales
Whale Pass
White Mountain
Willow

201 - 300

Atmautluak *
Chefornak *
Cold Bay
Eek
Elim
Grayling
Holy Cross
Kachemak
Kaltag
Kivalina
Kongiganak
Labouchere Bay
Lower Kalskag
Napakiak *
Napaskiak
Noatak
Cuzinkie
Port Moller
Ruby
Teller
Tuluksak *

Tuntutuliak *
Whittier

301 - 400
Aniak
Healy *
Kasigluk
Kwillingok *
Naknek
New Stuyahok
Nulato
Old Harbor

401 - 500
Akiachak *
Big Lake
Kwethluk *
McGrath
Shishmaref
Tanana

501 and Above
Adak
Angoon
King Cove
King Salmon
Noorvik
St. Paul
Sand Point
Selawik

This listing is current as March, 1984. It would not be surprising to discover that the status of some of these communities had changed by this time.

# Population under 25 or no population listed.
* Receives Public Television.

Source: Division of Telecommunications Services, 1984 Inventory of Communication Facilities Serving Alaskan Communities, ADOA, 1984.

Appendix III

Satellite Television in Alaska

Movies
The Movie Channel - S3
Home Theater Network - S3
Cinemax - S3 & G1
The American Network - S4
SelecTV - C4

Movies & Specials
Spotlight - S3
Showtime - S3

Movies, Specials & Sports
JPD Television Network - C4
Home Box Office - S3 & S4
ON TV - C4

Ethnic
Black Entertainment TV - S3 & W5
National Spanish TV Network - S3
Galavision - W4

Super Stations
WGN (Chicago) - S3
WTBS (Atlanta) - S3
WPIX (New York) - S4
WOR (New York) - W5

Sports
Entertainment & Sports Programming Network - S3

Unique Programming
USA Cable Network - S3
USA Blackout Network S3
Cable Satellite Public Affairs Network - S3 & G1
The University Network - W5
The Entertainment Channel - S4

Weather
The Weather Channel - S3

Women's Programming
Daytime - S3

Family
ACTS - W5

Music
Nashville Network - G1
Music Television - S3
Country Music Television - C4

Cultural
Arts and Entertainment - W5
Alpha Reportory Television - S3
Bravo - S4
CBS Cable - W5

Adult Entertainment
Escapade/Playboy - S4
EROS - W4
Fantasy Unlimited Network - W5

News
Cable News Network - S3
Cable News Network 2 - S3
Reuters Monitor Service - S3

Religious
Praise the Lord - S3
Christian Broadcasting Network - G1
National Jewish Television - S3
Eternal World TV Network - S3
National Christian Network - S4
Trinity Broadcasting Network - S4

Business News
Biznet - S4
Financial News Network - W4

Children's Programming
Disney Channel - G1
Nickelodeon - S3

Educational
The Learning Channel S3

Health
Lifetime - S3

Consumer Information
Modern Satellite Network - S3

Variety
Satellite Program Network - S4

This list is not exhaustive, it excludes some parttime networks and national broadcast network feeds.

Key

S3 - Satcom F3
W5 - Westar 5
S4 - Satcom F4
G1 - Galaxy 1
W4 - Westar 4
C4 - Comstar D4

Source: Satellite Orbit, "Birdwatcher Program Guide", July, 1984

Appendix IV

Satellite Television Program Fees

Entertainment and Sports Programming Network: 10¢/month/subscriber
Cinemax: $5.00 - $6.00/month/subscriber
WTBS: 25¢/month/subscriber
Disney Channel: $5.00 - $6.00/month/subscriber
Nickelodeon: 10¢ - 15¢/month/subscriber
Home Box Office: $5.00 - $6.00/month/subscriber
Cable News Network: 25¢/month/subscriber
Lifetime: no charge
Music Television: 15¢/month/subscriber
Arts and Entertainment: 10¢/month/subscriber
WGN: 15¢/month/subscriber
USA Cable Network: 15¢/month/subscriber
Nashville Network: no charge

These prices are not precise, most charges are negotiable, based on the number of subscribers in a particular system.

Source: Ross Hammock, McCaw Cablevision, August 22, 1984.

Cost Scenarios

	Schedule A	Schedule B
	PBS	LA
	LA	HBO
	CBS	WTBS
	NBC	Disney
	ABC	Cinemax
	HBO	Nickelodeon
	WTBS	CNN
	Nickelodeon	MTV
	WGN	Arts & Ent
	CNN	USA Cable
	ESPN	ESPN
	Arts & Ent	WGN
Costs per month per subscriber:	$6.00-$7.00	$16.30-19.30
Annual costs (for 10,200 subscribers, FY 1985):	$734,400 - $856,800	$1,995,100 - $2,363,300

Schedule A - A basic "economy line" of programming, with a little bit of everything. Assumes that the national network feeds could be obtained at no cost.

Schedule B - A "cadillac" selection, with several premium channels.

Appendix V

Requests for/complaints about lack of Public Television Service
As received by Alaska's Four PTV stations over the last year

Station	Number of Contacts	From Where?
KTOO-TV Juneau	12	All NANA region villages and Nome
	6 or more	Haines/Skagway
KAKM-TV Anchorage	6	Unalaska/Seward
	100	Kenai Peninsula translator problems
KUAC-TV Fairbanks	50	Nome, Barrow, Ft. Yukon, Venetie, Beaver, Circle, Anaktuvuk Pass, Ruby
KYUK-TV Bethel	56	Alakanuk, Aniak, Chuathbulak, Chefornak, Chevak, Crooked Creek, Eek, Emmonak, Hooper Bay, Kipnuk, Kongiganak, Kotlik, Newtok, Nightmute, Pitkas Point, Quinhagak, Red Devil, Scammon Bay, Sheldon's Point, Sleetmute, Stoney River, Tuntutuliak, Tununak, Toksook Bay
Total	230	

Source: APBC, July 2, 1984